The world will be up to an average of 5°C warmer by the end of this century.

BUILDINGS ARE 50% THE CAUSE
PEOPLE ARE 100% TO BLAME
CURRENT TRENDS TO 2035

- World energy +41%.
- World emissions +29%.
- Population 8.8 billion.
- Natural resources +50%
- Coal +1% per year
- Gas +1.9% per year
- 1.3m per week moving into cities

COP21 = 2°C a 50-50 chance

- 2°C = a challenging world
- Precipitation = 10% per °C
- Arctic sea ice loss = 15% per °C
- Crop yield reduction = 15% per °C
- Hottest days Europe could rise by 6°C
Already over the past 50 years, the annual average temperature of Vietnam has increased by 0.5 degree Celsius.
Mumbai, Kolkata and Chennai are the largest cities on the coast of India.

Approximately 50,000 square miles of land fall under this zone.

A population of over 60 million.

Population Displacement in India Due to Climate Change

3 Feet = 125 Million People
New research says hundreds of thousands of lives are at risk from air pollution over next two decades.

06 Mar 2015

Air pollution killed around seven million people worldwide in 2012, WHO’s latest report.
The key point is that in the 2020s, the world is likely to be considerably more difficult and costly than now.

International Energy Agency (IEA) Their 2011 World Energy Outlook

“The world will have to spend an extra $500 billion to cut carbon emissions for each year it delays implementing a major assault on global warming.”
ONE PLANET
ONE ENVIRONMENT
ONE CHANCE

WE CURRENTLY CONSUME NATURAL RESOURCES 50% FASTER THAN THE EARTH CAN REPLENISH THEM

2050

BY 2035 GLOBAL GDP IS LIKELY TO INCREASE BY +75% PER PERSON

IN 2050 WE’LL BE FINE

ALL WE’LL NEED IS 3 EXTRA PLANETS
By 2035 the following is likely:

- energy use up by 41%
- emissions up by 29%
- city population reaches 65%
- World GDP GROWS BY 75%

Currently

50% OF GLOBAL WEALTH IS OWNED

BY 1% OF THE PEOPLE
Cities –
A big opportunity if we embrace progressive deep refurbishment of our existing buildings combined with integrated decision making

1.3 million move into cities every week

The lack of whole life thinking means we take isolated decisions and choices without dealing with impacts on wider aspects of environment, energy and life cycle.
RenewEconomy.

December 3rd, 2014
Originally published on
world record conversion of
sunlight into electricity

Europe,
After a multi-junction solar
cell developed through a
French-German collaboration
achieved 46% efficiency.
Luke Howard in 1810s
The phenomenon “Urban Heat Island” was first investigated and described by him

1905 Einstein
\[ E = hf \]
Enabling Solar Energy

1931 EDDISON
THE FUTURE IS IN THE SUN
WE SHOULD NOT WAIT FOR FOSSIL FUELS TO RUN OUT

1943 Tesla
We build but to tear down most of our work and resource is squandered.

“IT is not often that nations learn from the past, even rarer that they draw the correct conclusions from it.”
— Henry Kissinger
Humanity is currently outstripping the earth’s capacity to produce natural resources by up to 50% hence we are not designed for sustainability.

1. System of function
2. System of the inter-connectivity
3. System of the Environment
4. System of the Earth’s resources capacity

1. e.g. a built environment to house office workers
2. How the building connects with its urban location
3. How the building impacts on the environment
4. How the building uses/re-uses natural resources

(Influenced by Adcock R 1987)
Designing for the future

Revolution Design it Today
• Advance materials
• Localised power production
• Re-cycled materials
• High efficiency designs
• Deep Refurbishments
• Integration and collaboration

Sustainable Development

Design For the Future
• Clean renewal energy
• Re-using materials balancing natural resources
• Adaptability
• Design for Life

Design it Today
Design now what we need in the future

What we need Tomorrow
Visualise what we need to do

Whole Life Examples

Scottish Schools Energy & Water management contract (23 Schools)

4 Year actual operational results against agreed client benchmarks

Achieved total savings = £748,000
Annual average = £187,000/year

Investment in whole system management (including engineering) = £75,060/year

Return on investment Actual:

£187,000 - £75,060 = £111,904/year

Total benefit:
Life Cycle = 25 years Saving = 25 x £111,904 = £2.8m

Carbon saving 4 years actual = 5553 tonne Life = 34,706 predicted

Items not included in cost benefit
• Improved system reliability
• Improved system management should achieve improved life cycle
### Whole Life Examples

#### British Telecom – London Tunnels (23km)

Innovation: Dynamic Whole Life Automatic Environmental Management System

<table>
<thead>
<tr>
<th>Capital Costs:</th>
<th>£854,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual (based on commissioning results):</strong></td>
<td></td>
</tr>
<tr>
<td>Whole life Plant Saving:</td>
<td>£54,000</td>
</tr>
<tr>
<td>Operational Energy Saving:</td>
<td>£53,000</td>
</tr>
<tr>
<td>Operational Environmental Saving:</td>
<td>£41,000</td>
</tr>
<tr>
<td>Total</td>
<td>£148,000</td>
</tr>
</tbody>
</table>

Payback £854,000 / £148,000 = 5.7 years

Overall system life = 24 years
Extended life (predicted) = 9 years

Return on investment = (24 years – 5.7 years) x £148,000 = £2.7m predicted
Carbon saving = 509 tonne/year = 2216 tonne total 42% predicted

Items not included in cost benefits:
- Client maintenance saving
- Extensive reduced damages to clients facility
- Improved compliance to air quality standards
Holistic whole system thinking

CONSUMPTION

- Impact Natural Resources
- Energy Source
- Conversion Process
- Power Production
- Distribution Process
- Consumption Process

IMPACT

- Impact Environment
- Waste/Discharge Process
- Pollution

Can we?

Whole System Behaviour

Behaviour

Collaboration and Integration

Interaction

Input

Outputs

Destruction

Utilisation

Irreversible Components

Natural Resources

Collaboration and Integration

Environmental Impact

Re-cycling

Behaviour

Can we?
Context for whole systems thinking

1% OF HUMANITY OWNS
50% GLOBAL WEALTH

62 BILLIONAIRES WEALTH
GREATER THAN TOTAL
POOREST 3.4 BILLION

THE 10% WEALTHIEST OF
SOCIETY ARE CAUSING 50% OF
THE ENVIRONMENTALY
DAMAGING EMISSIONS.