



Engineering for Climate Change-the adaptation challenge and the role for engineers

Peter Head *OBE FREng FRSA*
 Director, Head of Global
 Planning
 Arup
 London, UK
peter.head@arup.com



Peter is a champion for developing global practice that demonstrates that the way we invest public and private money in the built environment could be made very much more effective if the public and private sector adopted sustainable development principles. He is a civil and structural engineer who has become a recognised world leader in major bridges (he received an OBE for successfully delivering

1. Introduction

In recent decades it has become clear that there can be no viable future for humanity without a healthy planet. Earth, water and air support the existence of an immensely complex living system, powered by the sun. We are part of this web of life and within a few generations we are using up most of the earth's stored fossil fuel resources. Their transfer from the earth to the atmosphere is significantly altering its composition. From our ever expanding urban centres, our tentacles now spread across the world. Our globalising economic system is destabilising the planet's life-support systems-the very systems that support us and the future of our children.

I aim to provide some innovative answers to the questions that flow from this:

- Can we move towards a sustainable way of living?
- What policies and investments are needed in low, middle and high income countries?
- What is the role of the engineer in leading this transition to an Ecological Age?

I will start by examining the problems we are facing and then highlight the opportunities for change using examples of city retrofit and design of new urban settlements. I will show what we can do over the next 50 years and draw some firm conclusions about policies, changes, investments and the role of the engineer.

2. The transition to the Ecological Age

The earth spins round the sun and is a closed system. It receives energy from the sun and exports only energy into space. Photosynthesis in plants converts the sun's energy into carbon material which over human history has provided our primary energy source and has been the root of our food supply chain.

From 1700 The Industrial Revolution took civilisation from the Agricultural Age to the Industrial Age and into a resource dependent lifestyle in urban centres. There were voices of concern, even then, like economist Thomas Malthus(1) who argued that increases of population would at some point overwhelm our ability to feed ourselves. But many of these predictions have proved to be wrong because of our extraordinary