

BSRIA Briefing 2011

Building on Opportunity

Jeremy Watson FREng
Chief Scientific Adviser: DCLG
Director: Global Research, Arup

Challenges and Opportunities

The type and size of the challenge

Government policy: responses and regulation

Preparedness of the supply chain - business models

Enablers

New tools – BIM, multi-dimensional modelling

Collaboration and Cross-disciplinarity

Globalisation

UK Science & Engineering CSR settlement

EU funds

Our Speakers

Tristram Carfrae

Arup: Principal and Fellow

Keith Clarke

Atkins: Director of Sustainability

Paul Fletcher

Through Architecture: Co-founder

Donald Daw

Mitsubishi: Commercial Director, Environment

Rt Hon Michael Portillo (lunchtime)

Former MP, broadcaster and political commentator

Sustainability and growth

Challenges and opportunities

Sustainability

- UK's impact only 2% of world-wide Greenhouse Gas emissions
- but*
- 'They won't if we won't'
 - Energy security a key concern
 - Big investment needed to meet 2050 goals

Growth opportunities

- Infrastructure enables national economic capability
- Refurbishment market
- Tools will reduce risk and increase productivity

Priorities for the Built Environment

Adaptation (time-frame 0 to 50+ years)

- Global temperature increase has already led to seasonal extremes
- 23,000 excess deaths in EU in 2003, ~900 in UK
- Need to design buildings with passive cooling (and ensure that compliance with high code levels does not make things worse)

Energy shortages (time frame 5 to indefinite years)

- Global depletion of fossil fuels and exhaustion of indigenous fossil fuels
- Drive to de-carbonise central energy resources – need to ‘go nuclear’
- Need to minimise energy consumption in buildings

Mitigation (time frame 0 – 200+ years)

- We have to live with effects of already-emitted carbon for 200+ years
- Ultimately must bring carbon emissions to an equilibrium point
- Possible active sequestration – CCS plus atmospheric abatement
- Buildings viewed at district-level should be carbon neutral or negative

Regulatory obligations

- HMG is committed to an 80% reduction in carbon emissions by 2050 and 45% of all present carbon emissions come from existing buildings, with 27% from homes
- 80%+ of existing buildings will still be here in 2050
- Standards – e.g. worst choices should be made less attractive or removed
 - Code for Sustainable Homes, BREEAM, etc.
- Obligations – e.g. mandatory emissions reduction targets
 - **2016** – Residential new build zero carbon
 - **2019** – Commercial new build zero carbon
 - **2050** – 80% carbon impact reduction: legacy and new build

Policy examples

Government commitment

- Greg Clark appointed Minister for Cities, Summer 2011

Localism

- Local Enterprise Partnerships, Regional Growth Fund, Enterprise Zones
- Devolved authority, e.g. domestic renewables installation without express planning permission

De-regulation

- Red-tape challenge
- One in, One out

Planning

- Out with RSS, in with NPPF
 - *Presumption of 'developable' rather than brownfield land*
- Plans to widen the power to direct applications for major infrastructures projects into the major infrastructure planning regime.

Construction Innovation & Growth Team

Paul Morrell

Chief Construction Adviser

Housing

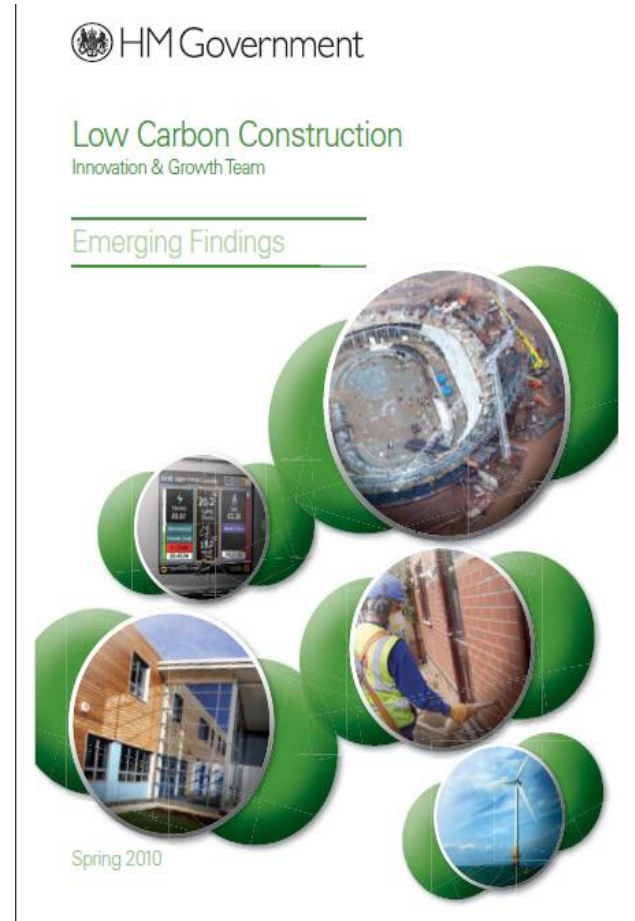
Buildings

Infrastructure

Major Projects

Key outcomes:

- *Responses from Departments*
- *Green Construction Council*
- *Procurement Guidelines (BIM)*



Infrastructure UK

Some £200 billion of investment planned over the next five years, across the economic infrastructure sectors (energy, transport, waste, flood, science, water and telecoms)



Infrastructure UK

IUK has been set up as a separate unit within HM Treasury, providing advice to the Commercial Secretary to the Treasury who leads on infrastructure issues and who reports to the Chancellor of the Exchequer

IUK aims:

- To provide greater clarity and coordination over the planning, prioritisation and enabling of investment in UK infrastructure;
- To improve delivery of UK infrastructure through achieving greater value for money

An expert advisory group (EIEG) is working to identify technical interdependencies and opportunities

DECC 2050 Pathways

Calculator and scenarios: <http://2050-calculator-tool.decc.gov.uk/>



Buildings: retrofit challenges

Issues

- ~22m homes to be retrofitted by 2050 \Rightarrow 1500 per day from now 'till 2050
- £10,000 - £20,000 cost per home
- Impact of £220bn - £440bn
- Inhomogeneity of stock implies challenge in achieving 'standard solutions'
- Lack of standard solutions implies difficulty in obtaining cost-down through scale

Needs

- Cooperation across the supply chain – industry association as collaborative and single-minded as SEMI
- Deployment at scale of relevant materials, components and systems
- Skills to install
- Behaviour change
- De-risked finance models – investment-quality energy audits

EU collaboration: Energy Efficient Buildings PPP



Arup is UK Association representative on behalf of BIS

Shape

- EU-wide Public-Private-Partnership for research and demonstration
- Large scale research (80%) and demonstration (20%) program
- Driven by the industry grouped in E2B Association

Size

- Aspiration: €2 billion over 10 years
- Commitment: €500m from 2010-2013 from president Barroso

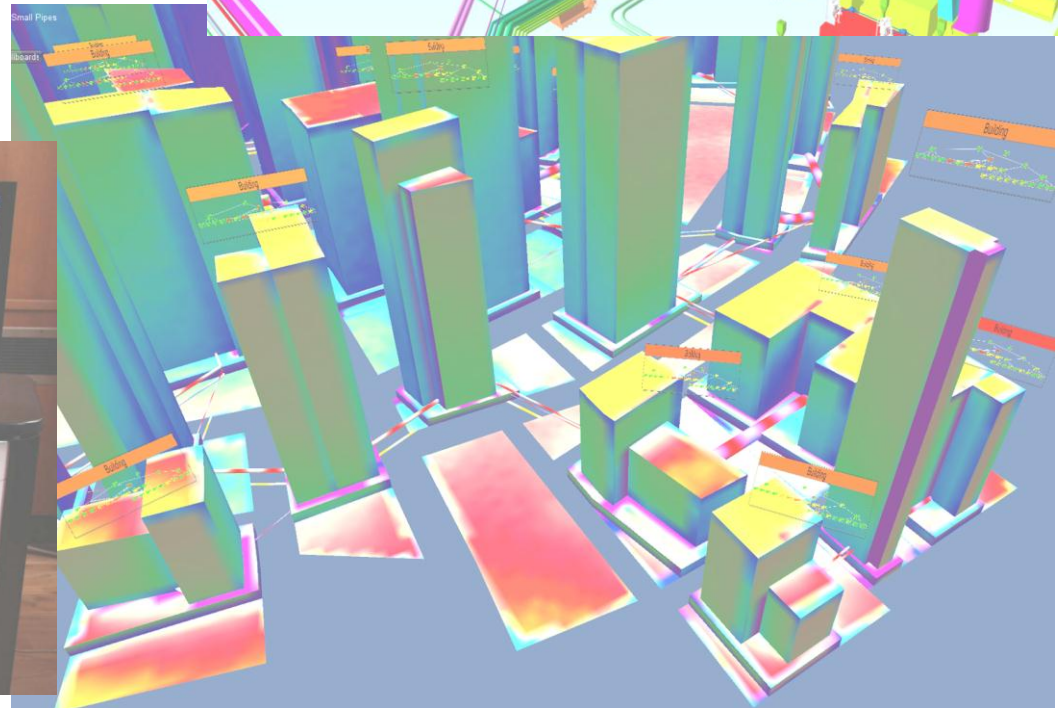
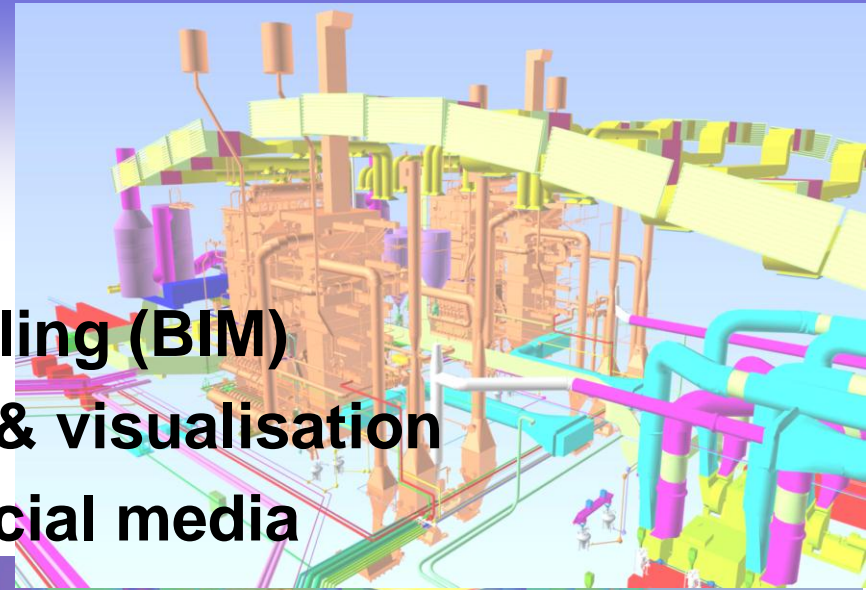
Remit

- Reduce energy consumption and CO2 emissions
- Improve EU energy independence

New tools

E.g.

- Building Information Modelling (BIM)
- N-dimensional co-creation & visualisation
- On-line 3D – design and social media



New products and services

- Systems approaches to architecture and design, construction and operation, including occupant engagement
- Building management control
 - Easy wins
 - Internet-enabled services; performance assurance, preventative maintenance
- Investment-quality building energy monitoring
 - De-risking PAYS schemes
- Occupant behaviour modification
 - Effects of design and regulation
 - Human feedback

New behaviours to enable growth

Challenges for the industry and its knowledge and physical supply chains

- Research, demonstration and business collaboration down the length of the supply chain
- The players?
 - Universities and Research Technology Organisations
 - Manufacturers of components and systems
 - Architects, designers and engineers
 - Construction and Facilities Management
 - Owners and Users
- “If we collaborate now, how much bigger will the market be in two years?”
- Concurrent as well as serial development

Built environment in the 22nd century

- Designed as an integrated and organic system
- High density, low rise, mixed use, 'walkable'
- District-level thermal and electrical energy from waste and renewables
- De-carbonised electricity grid – nuclear and large-scale renewables, with distributed energy storage and HVDC links to Europe
- Water recycling and re-use; local pluvial management
- Local, hyper-automated manufacture of consumables, including food
- Service provision augments ultra-durable capital consumer goods
- Adapted dietary habits and food requirements
- Reduced population, post demographic bulge, pervasive behaviour change
- New work styles enabled by ultra-high bandwidth ICT