Innovation
- in a squeeze!

Rumford Club 17 November 2011

**Hywel Davies** 

Technical Director – Chartered Institution of Building Services Engineers





The Squeeze

### "Retire? Not 'til we're 70" Squeezed middle classes plan to keep on working to bail out their children"



http://www.newstatesman.com/blogs/the-staggers/2011/02/wage-squeeze-benefit-tax

### Water

### **'Winter drought' could mean hosepipe** bans next year

The first winter drought in almost a decade could mean water rationing in certain parts of Britain over Christmas and hosepipe bans in the coming year.

Daily Telegraph, 15<sup>th</sup> November 2011

### **Energy supply**

### The £200bn energy investment fantasy

Will the UK's largely foreign-owned energy industry find £200bn to meet the 2020 targets for renewable energy usage and carbon reduction?

Following the Government's proposed electricity market reform, the Secretary of State for Energy and Climate Change, Chris Huhne, seems to think – or certainly hopes – so. The Coalition's energy policy is, after all, very much a continuation of the previous government's policy.

For all that, £200bn remains a staggeringly large sum of money. It will fully finance other supposedly unaffordable projects several times over:

21 London 2012 Olympic Games,33 Queen Elizabeth Class aircraft carriers,clearing the UK's budget deficit with room to spare for tax cuts.

### The £200bn energy investment fantasy

Will the UK's largely foreign-owned energy industry find £200bn to meet the 2020 targets for renewable energy usage and carbon reduction?

Following the Government's proposed electricity market reform, the Secretary of State for Energy and Climate Change, Chris Huhne, seems to think – or certainly hopes – so. The Coalition's energy policy is, after all, very much a continuation of the previous government's policy.

For all that, £200bn remains a staggeringly large sum of money. It will fully finance other supposedly unaffordable projects several times over: 21 London 2012 Olympic Games, 33 Queen Elizabeth Class aircraft carriers, clearing the UK's budget deficit with room to spare for tax cuts.

Institute of Directors, Big Picture, Q3 2011



# Saving the dream of centuries



#### Bond yield spreads

10 -year bonds, spread over bunds (basis points) 600



10-year bonds, spread over bunds (basis points) 3000 2500 Greece 3050 - Greece 1500 bretand 1500 500 0 - Greece 1000 1000 Italian and French banks 5-year CDS Spread (basis points)



### Relative labour costs

Unit labour costs in manufacturing relative to Germany (rebased)



Sciences: Theorem Reutins Datactment: Mariet: DECD, Naver Analytics

### What's in the current policy mix?

### Who leads on what?



### **UK commitments to zero carbon**

- Government committed to zero carbon homes from 2016
- non domestic buildings zero carbon from 2019
- changes to Energy Performance of Buildings Directive agreed in 2010, set a final deadline for "nearly zero energy" buildings by 2020
- Hence consultation package on changes to Part L to come into force in 2013 are currently being prepared

### We are getting towards the limits:

- Current technology can only go so far
- notional building approach stretching?
- Relative vs. Absolute
- How far can SBEM take us towards

"nearly zero"?

But there is room for further gains in the 2013 revision

"If you always do what you always did, you'll always get what you always got!"

**Mark Twain** 

The first man to write a novel (Huckleberry Finn) entirely on a typewriter

### "We can't solve problems by using the same kind of thinking we used when we created them."

### **Albert Einstein**

## So what's to do?

### Innovation

"An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations. " OECD

# So what might innovation look like?







So what might Product innovation look like?

### Confidence call Walkie Talkie to go ahead



Land Securities showed its confidence in the UK's office market by confirming it will proceed with its planned London skyscraper despite the tough economic conditions Report Page 19

## **Innovation?**

**Novelty?** 

**Fashion?** 



# How might policy drive innovation?



### **BIM and COBie**



							CLIENT DETAILS HERE
	HEARC		1			Rez. J	
C Director Director	Mand Two hart Spine Jim D A → D → A → A → A → A A → A → A → A → A → A → A → A → A → A →	n goden jóg Angeför n x - 13 11 ag ell och		69 A.B.			
Normal Law Community Commu		na govine (de Angele) - ro- th X + 1 1 1 (d an al original) 0	-		fiere of the field		
		0 (1994) (199 Addy 199 0 (1994) (199 X + 14 (1) (1994) (199 ) 0 0 0 0 0 0 0 0 0 0 0 0 0	a a con	, , ]	Information of the second seco	Interface -	
		Bits         Spectrum         Spectrum <th< td=""><td></td><td>· · ·</td><td>Inclusion of the second s</td><td></td><td></td></th<>		· · ·	Inclusion of the second s		
Monorad Long 20 Her Law a car of a set a ca		Book         Book         Adapa PDP           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0			in the second se	And a second sec	
		Book         Book         Adage PEP           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0           0         0         0         0         0           0         0         0         0         0           0         0         0         0         0           0         0         0         0         0           0         0         0					A CONTRACTOR OF A CONTRACTOR O
		Bodes         Hop Adaptifie           B. X + 14 (1/1000)         Bodes           B. X + 14 (1/1000)         Bodes           B. X + 14 (1/1000)         Bodes           B. X + 1000         Bodes           B. X + 1000<	and a second sec	· · · · · · · · · · · · · · · · · · ·			
		Bit         Bit         Ange 100           0         0         0           0         0 <t< td=""><td></td><td></td><td></td><td>And a second sec</td><td></td></t<>				And a second sec	
		Bit         Bit         Addp+10*           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line         In the line         In the line           In the line <td< td=""><td></td><td></td><td></td><td>International International In</td><td></td></td<>				International In	
		By Default         Bally         Adaps PDF           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0           0         0         0         0           0         0         0         0         0           0         0         0         0         0           0         0         0         0         0           0         0         0         0         0           0					
		Bandom         Home         Analysis           0         Marcine         Marcine         Marcine           0					
		Bits         Bits         August00           1         Market         Market         Market           1         Market         Market         Market           1         Market         Market         Market           1         Market         Market         Market           2         Market         Market         Market           3         Market         Market         Market           3         Market         Market         Market           3         Market         Market         Market           3         Market         Market         Market           4         Market         Market         Market           5         Market         Market         Market           6         Market         Market         <					
		Bit         Bit         Addge 100           1         <		A 10     F      F			
		Bit         Bit         Addy HD           In Control Mark         In Addy HD         In Mark         In Mark           In Control Mark         In Addy HD         In Mark         In Mark         In Mark           In Control Mark         In Mark					
		Bode         Date         Augusto           0         Bode         Bo					
		Booker         Booker<					
		Bit Market         Bit Market         Andre HUR           1<					
		Bit         Design (b)         Addp + 10*           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)         In Charles (b)           In Charles (b)         In Charles (b)         In Charles (b)         In Charles					

41 IF a Bacondiga cam Sole (13411) St SHOW: Byten Component and Support 14 + + + + + Debutter / Centerl / Partle / For / None / Sole / Type / Component / Spiter / Shield

### **COBie data**

the Disk Annual Distance allowed	Conte Data Mongana Epuile propiéte h	CP	Lincols			And States	Type & guegest for fight.	
	·	10 10 10 10 10 10 10 10 10 10 10 10 10 1	A	a 10 a	B 2 0 = =	- 14 M	A A TOR BRIDE	<u></u>
a tha the side start that a start and	AA THE BARK WITH COMPANY AND RECENT	the second second second			100000000000000000000000000000000000000	25.		
A + 16								
A. 8	6 0				19	84	4 24	
			1000					1
							1.2	1007
141	0 E				11	2	12 3	1000
* 2	8 8		1.1		1.5	8	13 5	1000
2 2	- A	-			3	- 3	3 3	
or the A termination over 10000	I GATTER DE DEUTSchweite Berne	1	HAA	mar Type Of	#iDe	1012	104 01 1	1000
tor 1000 Agenticity and 2005	1-04711-08 38 Practicare Reveal	19	100 55	Nor Farm DA	(61) or		100.01.3	2004
nor-1000 harming a sum 2009-	1-Settil 00 Mightene Rente	P	200	toor Type D1	8.0%		005-01-2	12005
tor title hereitige cam port-	LOATTY OD IN Digitizen Barris	1	101 101 PC	mor Type Crt	1210100	-	1000-01-4	1000
THE PARTY OF THE P	COLUMN STREET, STORE		102.102.00	New Case St	2103		100 010	+000
the state of the s	CALL IN THE REPORT OF THE REPORT	1	tion where the		210	-	000.019	-1000
or told insurance cam have	1-04111 00 MUTHERMAN BATTS		MA HES TO	tour Type O1	a los		000-01-0	12000
ner 1980. Australia anna 2005	1 Setting in Contrast Colleg Dents	Assembly 19	HA II	harhaad Drost	Http://	1	10,000 812 81	12066
tor 1000 har ships care 2000	1-64711-06-38 Overhead Calling Overs	Assembly 19	198. 10	harhaad Door	8.0-1	-	C600-512-62	2009
tor 1998 toront Sign Lants 2009-	11-Self 11 08 MCContent Colleg Desite	Assembly 1	196 20	harha ad Chun	8.0%	-	C592-832-82	12000
NAL PORT AND A DAME OF A DAME	1 Auf 111 OR MICLASSING Control Conce	Assault 1	290 21	Nerteed Dear	(h) (h)		10000-012-04	+000
Contraction of the second	A REAL PROPERTY AND A REAL	ALL ROOM DOWNSTON	00 6	A REAL PROPERTY AND A REAL	175.7	and the second second		-11000
Contraction of the local sector	1-Saliti de la sever Sustain Contante	All support of the support of the	102 10	address Provider	020	New York	101.00.1	15004
1-3 Name and Address of Longers.	1-04111 OR MOTIVAL SUSTAIN CONTRACT	soft a send Competence	MA M	activit Pleater	ubs. o	Appendix 1	12943-299-1	12000
4.4 Igenating a party 10005	1-Sett11 05 MORUAC Bustom Compose	sold a stand of the spectrum of the	INGA SH	actions integrine	and Co.	ing and a set of the	12565-300-5	12004
1.5 Agenut Agenut Apply Costs 20079-	1.04TH OF 14 HOURS Bystem Compon	and a send if quipmant 1	MA P	adure meater	antyCe.	Topological Property lies	1365.300.4	20000
1.5 North Align Land 2005	1 Service of Service System Company	sing and Experiment. 13	196 24	an Brante Preutier	11NCH	Contractor	\$7243-299-2	2004
tornation and a second	1 04111 08 SELEVING Bystem Compen-	ants and Compressed	190 0	aduers - teater	1957	Concession in the local division of the loca	1743-200-5	- 6000
	Contraction of the second se	and a serie of the second second	00	and and interaction	116,0		- HOLOUI	+1000
145 Barriston Company	I SATTLE OF MARCHINE PROPERTY CONTRACT	And the Party of Concession of the	100 10		1220		041.327	13000
4.4.4 Approximation a new J 2000b	1-DeTITION IN DEVICE, Spatners Longer	and a good & spectrument of	-C.M	and and life areas	at a contract of	and the second s	P34.8-300 #	12001
1.12 Barrisby cam point.	A DATES OF STREAM BUSINESS CONTRACT	and and Figupment	008	aduant Heater	shift of	Applicant.	7365-300-8	2040
1.13 Banning a com 2009	1 OAT11 OR IN PRIVAC BUSINESS Configure	area and Experiment	100 20	adard Pleater	196.0	Concerne .	1243.200.4	2000
1 14 Summingly Comp.	LOCATION OF DEPROVED Business Company	NOTA AND STRATIONS	100 0	a di anti interatori	1000	120000	E 200-200-24	4.000
113 10000000000000000000000000000000000	CONTRACTOR COMPANY	State and Construction 1	000-00	a hard interaction	1000		- CON	+1000
117 Instanting cars. Added	THE PERSON NUMBER OF	states and if the second if	100	ad and Planter	1000		BIGH SSS #	+500
+ 18 Republic Cont 2005	I GATTI DE MERCINC Business Luciones	service and \$ sharpersons	100 54	adure reater	1000	and the second s	1343 300 12	1200
+ 15 Nametric Street 1985	1-Selfer on he proved flysters Company	and a good K spranness 1	MA 54	ad and Pleater	ats/or	and the second second	236.5-300-13	2664
4 29 Specification 2009-	1-54111 05 18 HOVAL System Compon	ant a good IC gargement 1	96A 34	adiald Headian	utgCo	ingenie inter	7345.300.54	2000
121 Summingut sum 2009.	I Gallin on Septimic Bustern Company	area and Copproved	290 23	adart Plaater	1960	Street .	2349-396.55	200
Contraction of the local	A REAL PROPERTY OF THE REAL PROPERTY CONTINUES.	NAME AND DESCRIPTION OF	07 0	analysis Plan	1000		- m 1845-	+022
A Description of the local	the first on he are the	solition and E spectrum of	10	sharing Fam	1200	and the second se	THE S PRINT	1222
A Burnhalt a cam	I DETTI ON DEPRIME BURNER COMPONENT	and a send F quantument		shause Fam	and the second	The second se	100 4 10 54	12004
A Specific Law 1005	I GATTER ON DESIGNATION COMPANY	and a send if spagements	100	whenced Plan	1000	and the second s	10.630 F 301	3009
4 handblin tom 2005	1-Setting South Act Systems Company	and a send Copyright and	200 X	shaurit Fan	abs.e	- and the second	148.8 - 585 - 62	12009
.F. Newstonger came places.	Contra on Internet System Contents	some and Exprigments [4	BGA II	scherood Flats	inter and	Concession in the local division of the loca	00.4.01.67	2000
A Development 2009	FIGHT FT OR DEDTVAL Bystem Compon	ares and Exponent 9	No. No.	shaugt Fan	InduCas	Transmission of the second	A. E. S. C. CO. E.F.	1 2009



### **Current key energy policies for buildings**

### Building Regulations

- "zero carbon" new build
  - reducing emissions from existing buildings
- EPBD Recast
  - "nearly zero energy" buildings new and refurb!

### Green Deal

- installing energy efficiency measures in existing buildings
- Incentives to install renewables through
  - Feed in Tariff for electrical installations
  - Renewable Heat Incentive for heat supplies
- Green Investment Bank to fund low carbon activity

"Zero Carbon"

What might "zero carbon" look like?

What does "nearly zero energy" mean?

Can we build and deliver them?

### **ZERO CARBON DEFINITION**



Zero Carbon Hierarchy: stepped progress towards a workable definition

## FABRIC ENERGY EFFICIENCY STANDARD

Allowable solutions

On-site low/zero carbon energy (and connected heat)

Energy efficiency

Building fabric performance

0

CONTRACTOR OF

DEFINING A FABRIC ENERGY EFFICIENCY STANDARD FOR ZERIO CARBON HOMES



So what might Organisational innovation look like?

ans - Mozilla Firefox	and the second
ligtory Bookmarks Iools Help	
X Crivit Constitution of a provint constitution with the constitution of the constitut	🏫 🔹 🚼 🔹 olympic velodrome london
ShiŞere Ni-Stal 🚬 Latest Headlines	
roup - R 🗴 🔚 Carbon 2.0: Can Londo 🗴 🔀 Browse Publications 🛛 🗴 Energy Act 2011 - Depar 🗴 🕅 ukp	oga_20110016_en.pdf × 🕴 📄 OECD Glossary of Statis × 🕴 🔕 Stirling Prize 2011: He
💭 🗐 🛛 Knowledge Portal	Not logged in
CIBSE	SHOPPING BASKET empty (E0.00)
	Territorian International States
Home Search Browse Publications Join CIBSE Help Login	
	Search
Browse	

#### A B C D E F G H I K L M N P Q R S T U V W AI CIBSE publications starting with A (5) Other publications starting with A (15) BSI data (172) AM10 Natural Ventilation in Non-Domestic Buildings (CIBSE Applications Manual 10) This publication is a major revision of the Applications Manual (AM) first published in 1997. At that time, there was a . significant expansion of interest in the application of engineered natural ventilation to the design of non-domestic buildings. ADD POF TO BASKET £49,40 Free to CHEE members The original AM10 sought to capture the state of knowledge as it existed in the mid-90s and present it in a form suited to the needs of every member of the design team. Some 10 years on from the time when the initial manual was conceived, the ADD BOOK TO BASKET £52.00 state of knowledge has increased, and experience in the design and operation of naturally ventilated buildings has grown. CIBSE member price £26.00 This revision of AM10 is therefore a timely opportunity to update and enhance the guidance offered to designers and users of VIEW DETAILS naturally ventilated buildings.

Castante

AM11 Building Energy and Environmental Modelling (CIBSE Applications Manual 11)



### \* 🗑 🌆 🐗

### Thank you for listening

### **Any questions?**

### **From Design to Reality**

A case study

Aided and abetted by Bill Bordass

### **Design intent to reality: perspectives** *1: the design claim, as published*



# Design intent to reality: how the gap widens 2: the basis for the design claim

Annual CO<sub>2</sub> emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity

<< Onsite renewable supply << >> Building energy demand >> expressed as CO2 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130



## Design intent to reality: how the gap widens 3: what it said in the log book supplied at handover

Annual CO2 emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity

<< Onsite renewable supply << >> Building energy demand >> expressed as CO2 -10 0 10 20 30 40 50 60 70 80 90 100 110 120



### Design intent to reality: how the gap widens 4: actual performance in use, before fine tuning

Annual CO<sub>2</sub> emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity

<< Onsite renewable supply << >> Building energy demand >> expressed as CO2



### **Components of energy performance: 5** *designers need to influence "unregulated" loads!*

Annual CO<sub>2</sub> emissions of energy use in a low-energy office building kgCO<sub>2</sub>/m<sup>2</sup> Treated Internal Floor Area at UK ECON 19 CO<sub>2</sub> factors of 0.19 for gas and 0.46 for electricity

<< Onsite renewable supply << >> Building energy demand >> expressed as CO2 -10 0 10 20 30 40 50 60 70 80 90 100 110 120

