



Costing the Code

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Agenda



- Key issues
- Approach to cost benchmarking
- Results
- Benefits
- Trends in costs

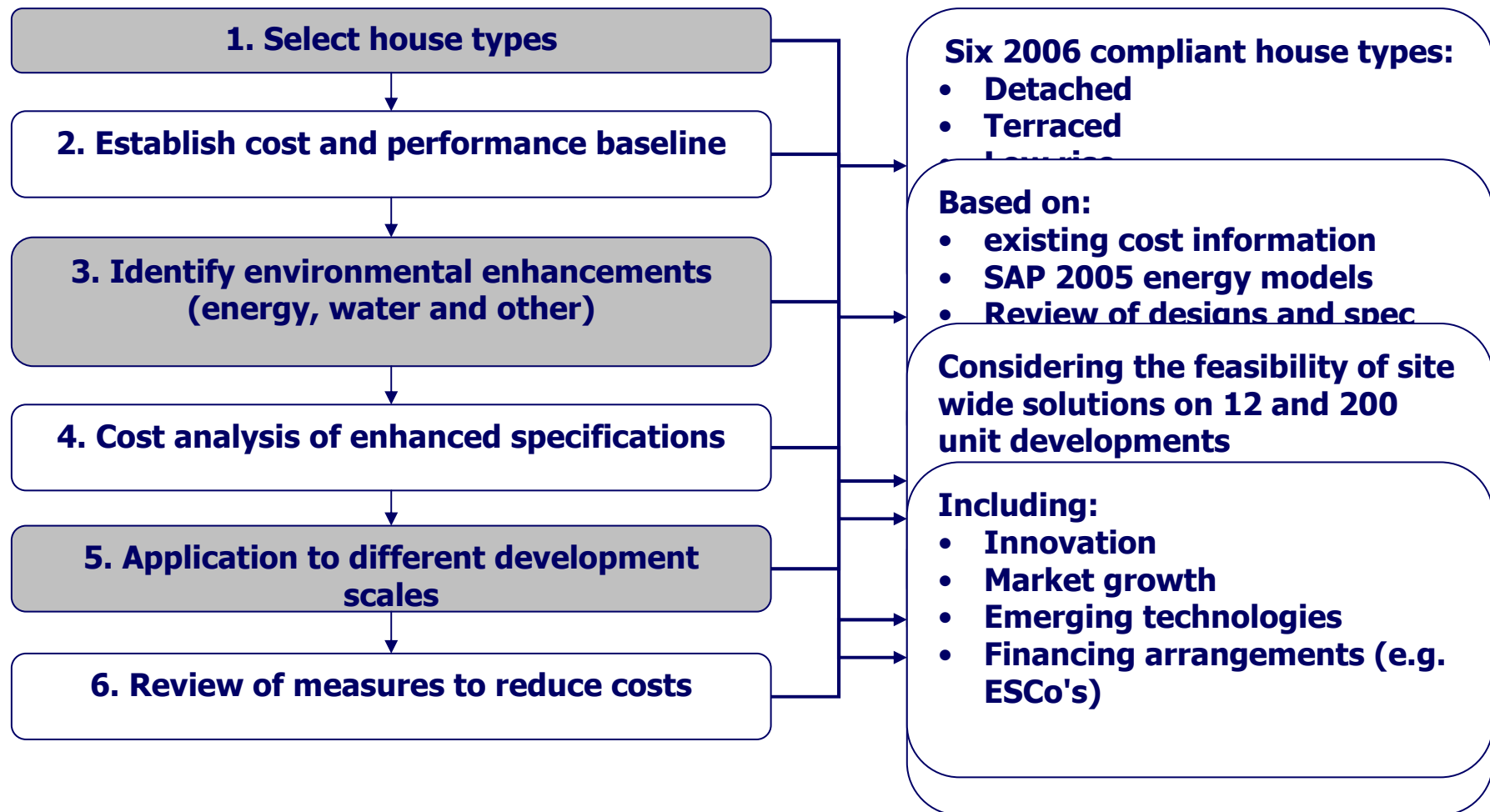
Commercial considerations?



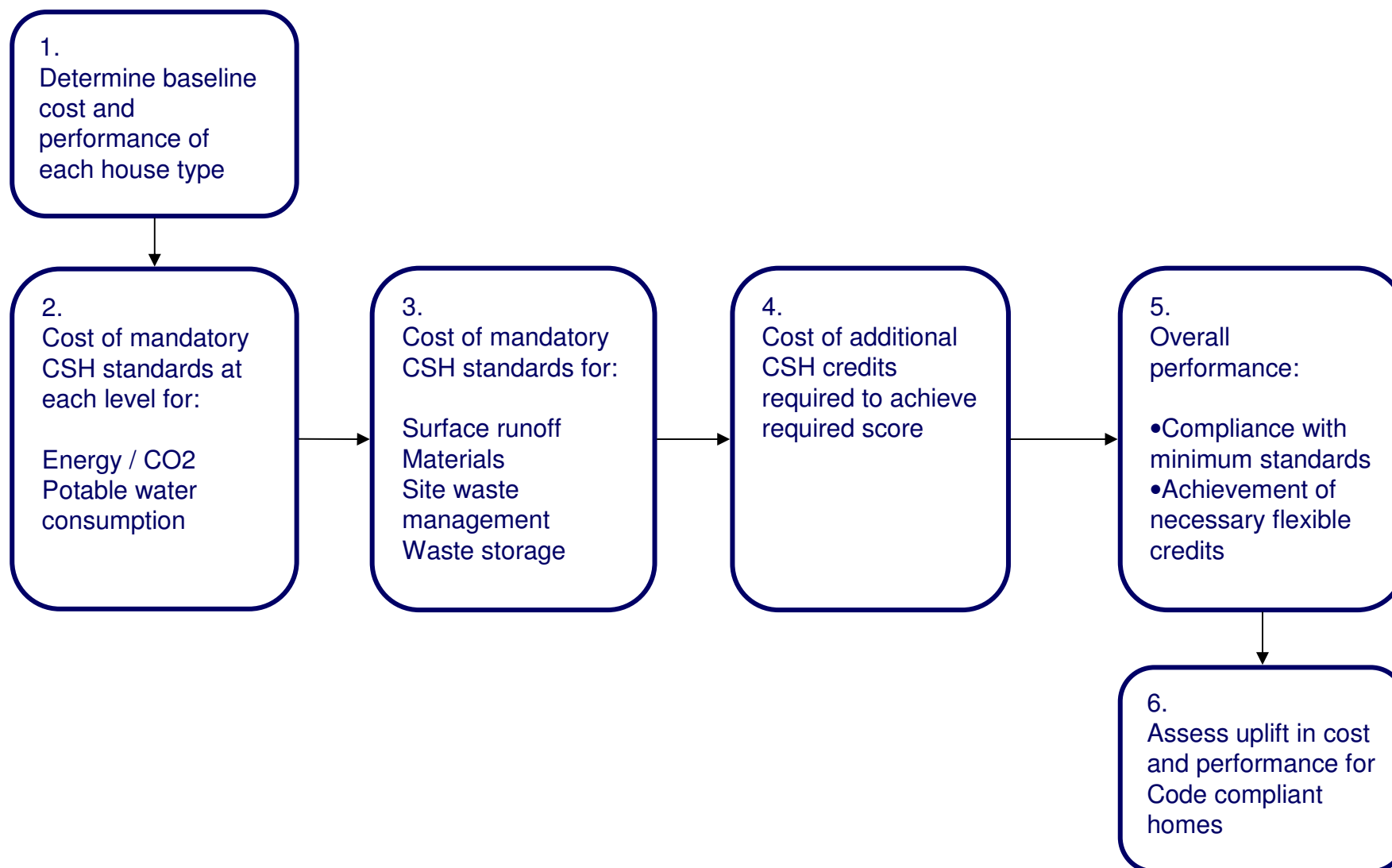
- Cost
- Risk and complexity
- Supply chain
- Availability
- Space
- Market 'standards'
- Ownership structures
- Maintenance and reliability
- Value to the homeowner!



Approach to cost study



Building up cost estimates



House types and construction costs



Home type	Base cost £m ² *
Detached (4 bed) – 116m ²	£785
Terraced (4 bed) – 101m ²	£740
Medium / high rise apartment (2 bed) – 88m ²	£1,415
Design for manufacture (2 bed end terrace)	£780**
Design for manufacture (2 bed mid terrace)	£780**
<p>*Base costs for 2006 compliant property</p> <p>**Base costs for Design for Manufacture compliant property (improved energy performance and EcoHomes Excellent)</p>	

Base specifications



Element	Traditional houses (detached and terraced)	Low rise apartment	High rise apartment
Storeys	2	up to 4	5-15
Foundations + ground floor	Strip footings and beam and block floor with screed finish	Deep strip with beam and block floor with screed finish	Piled foundations with ring beam and beam and block floor with screed finish
External walls/ structure	Dense blockwork with plasterboard on battens		Insitu RC concrete frame
Internal walls	Timber / metal studwork	Timber / metal studwork	Timber/metal studwork
Cladding	Brick		Aluminium panels/terracotta tiles
Upper Floors	Engineered I-beam joists	Metal joists with concrete	Insitu RC concrete
U values	Walls – 0.28 W/m ² K Roof – 0.14 W/m ² K Ground floor - 0.22 W/m ² K Windows – 1.8 W/m ² K		Walls – 0.28 W/m ² K Roof – 0.14 W/m ² K Ground floor - 0.22 W/m ² K Windows – 1.6 W/m ² K
Roof	Timber with concrete tiles		Concrete with steel standing seam
Windows and doors	PVCu		
Water fittings	Non controlled taps 6l flush toilets Standard bath (70 litres per use) Uncontrolled shower (flow rate of >15 litres/minute) No dishwasher + typical washing machine		
Electrical fittings	Regular (Part L compliant) light fittings 2 double power points in each room (kitchen, living room, bedrooms) Phone line to living room and master bedroom		
Heating/hot water system	Condensing boiler (SEDBUK B, Seasonal efficiency 85%) with hot water cylinder		Electric heating
External space	Garden, no shed	Communal gardens (fenced)	Balcony



Minimum energy standards



Minimum energy standards



	Level					
	1	2	3	4	5	6
Energy (% improvement over ADL1 2006)	10%	18%	25%	44%	100%	Zero carbon

Energy / carbon savings options



1. Basic energy efficiency measures
2. Microgeneration – PV, solar water heating, micro turbines
3. Site wide energy solutions
4. Advanced energy efficiency measures

Initial energy efficiency measures



- Generic measures
 - Delayed start thermostat
 - Time and temperature controls
 - Improved air tightness ($5 \text{ m}^3/\text{m}^2/\text{hr}$)
 - Improved insulation (e.g. between 0.25 and $0.21 \text{ kW}/\text{m}^2$)
- Combination of measures sufficient up to Level 2

Subsequent measures for level 3



- Scenario 1 - renewables
 - 4 m² solar hot water with PV pump or
 - 1kWp PV panel (7.5m²)
- Scenario 2 – energy efficiency
 - Whole house heat recovery (85% efficient + specific fan power of 1w per second)
 - Proprietary construction details (les thermal bridging)
 - Improved air tightness (3 m³/m²/hr)

Indicative energy costs at Level 3



House type	Detached house	Terraced house	Flat
Renewables	£4,000	£3,700	£2,900
Energy efficiency	£4,500	£3,950	£3,950

At levels 4, 5 and 6



Code level	Carbon Saving (%)	Small scale		Large scale high density	
		Technology	Cost	Technology	Cost
House					
4	44	Best practice energy efficiency and PV	£10,914	Biomass heating	£8,223
5	100	Biomass heating and PV	£22,367	Biomass CHP	£14,254
6	Zero Carbon	Advance practice energy efficiency, PV and biomass heating	£40,228	Advance practice energy efficiency, PV and biomass CHP	£31,125
Flat					
4	44	PV and Best Practice energy efficiency	£5,054	Biomass heating	£4,782
5	100	Best practice energy efficiency and Biomass	£12,055	Biomass CHP	£8,289
6	Zero Carbon	Advance practice energy efficiency, PV and biomass CHP	£18,430	Advance practice energy efficiency, PV and biomass CHP	£16,775

Key messages



- Scale and density are important factors after level 3
- Large scale wind is lowest cost where practicable
- Possible to achieve level 3 without renewables
- Solution needs to be considered in light of PPS 22 based requirements



Minimum water standards



Minimum water standards



	Level					
	1	2	3	4	5	6
Water (l per bedspace per day)	125	125	105	105	80	80

Water measures considered



- Calculation method different to EcoHomes 2006
- Technologies required
 - Dual low flush WCs (4/2.5 ltr per flush)
 - Flow regulated taps
 - Low flow showers (8 ltr per minute)
 - Undersized baths
 - Water efficient appliances
- At levels 5 and 6, either
 - Greywater recycling
 - Rainwater harvesting

Costs of meeting water standards



Code Level	Cost Range £ per unit
1 and 2	Nil cost effect
3 and 4	Circa £125
5 and 6	Circa £800 (flats) to £2,700 (houses)



Other standards





- Similar to EcoHomes 2006, key differences
 - Dwelling level compliance
 - Inclusion of Lifetime Homes
 - Revised approach to materials and flood risk
 - Removal of transport access related credits

Low, med and high cost credits



Free	£0	<ul style="list-style-type: none">• External lighting• Env impact of materials (roof, floor walls)• Responsible sourcing	<ul style="list-style-type: none">• View of sky• Insulation with low GWP• Secure by design• Considerate constructors scheme
Low	<£100	<ul style="list-style-type: none">• Home user guides• Composting facilities• NOx emissions	<ul style="list-style-type: none">• Sorting and recovering construction waste• Low energy lighting (>75%)• Providing drying space
Med	<100 to £250	<ul style="list-style-type: none">• Minimum daylight factors• External water consumption• Internal and external recycling facilities	<ul style="list-style-type: none">• Providing home office facilities
High	>£250	<ul style="list-style-type: none">• Eco-labelled white goods• Cycle storage• Management of surface runoff	<ul style="list-style-type: none">• Lifetime homes• Responsible sourcing of materials (highest levels)• Flood risk management (in high flood risk areas)

Minimising costs



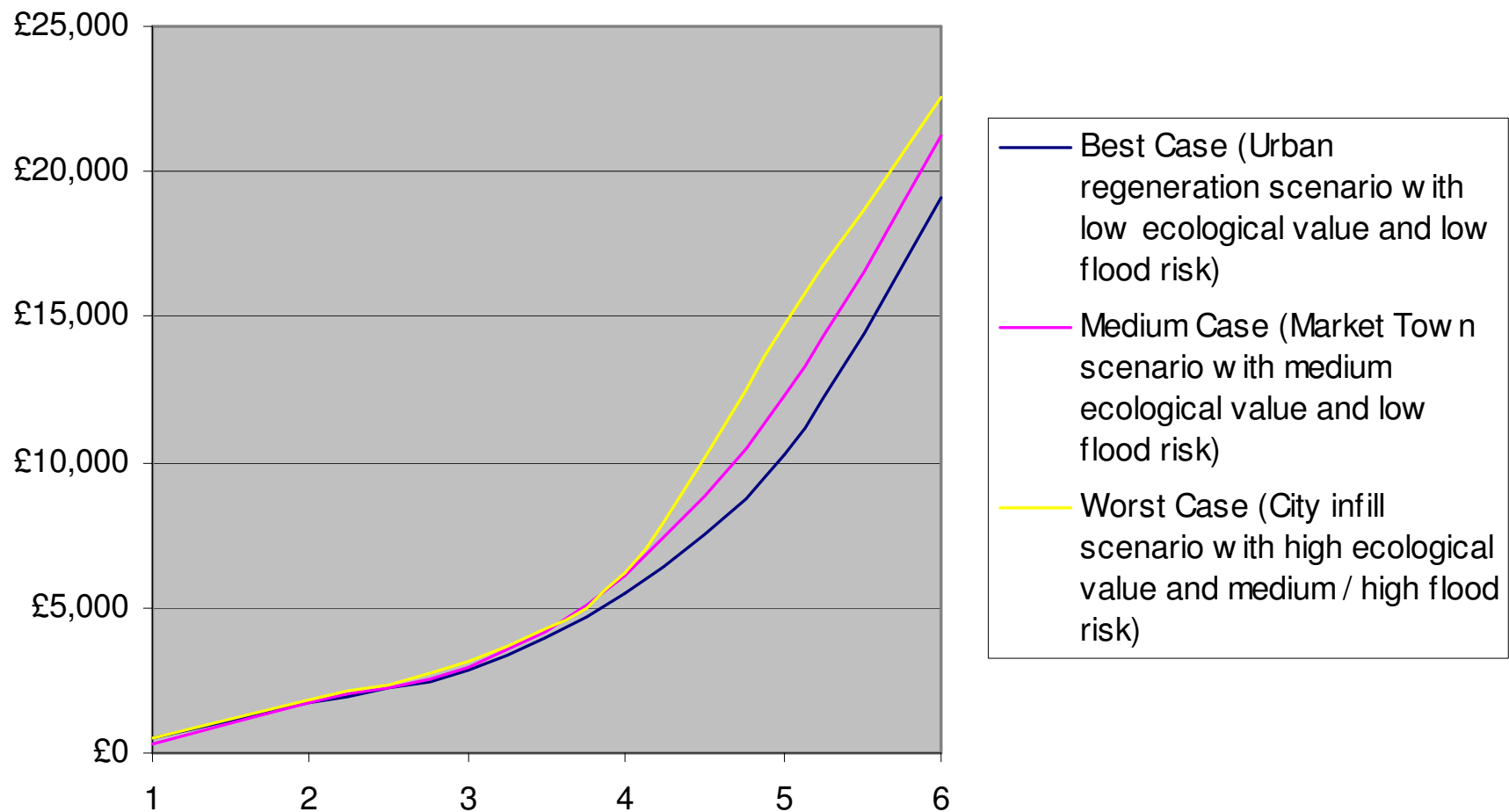
- Seek co-ordinated solution
 - Material selection can address
 - GWP
 - Env impact
 - Energy
 - Thermal performance
 - Sound
 - Responsible sourcing
 - Etc
- Design in key criteria, e.g. daylighting,
- Use contractors able to secure management credits



Overall costs



Overall costs (flat)



Comparison to EcoHomes VG



	Detached house	Terraced house	Flat
Additional cost for Code level 3	+3-5%	+4-6%	+3-4%
Carbon emissions (% improvement over ADL1A)	+25%	+25%	+25%
Water consumption (ltr per person day)	-21 ltr	-21 ltr	-21 ltr



The upside



Benefits of building to the Code



- Financial impacts (Code 6)
 - Energy savings up to £400
 - Water savings up to £180
 - Stamp duty relief?
 - £500 of annual saving = ~£9k of mortgage
- Environment
 - Carbon savings at level 6 of 2 - 4 tonnes per year
 - Water savings of 91m³ per 4 bed home
 - Reduced construction waste
- Quality
 - Increased security
 - Improved sound insulation
 - Daylight levels

Costs over time



- Code currently dominated by energy costs
- Marginal costs will fall as Building Regs. change
- Cost of energy compliance reduce by 10% and 25% by 2016
- Many other costs will disappear as market responds, e.g.
 - Robust details
 - Low energy lighting
 - Responsible material sourcing
- Changes to approach to measuring domestic CO₂ emission (SAP)



Conclusions

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- Costs dominated by energy standards
- Small / low density sites have higher costs
- Major change in approach needed beyond level 3
- Cost savings from innovation are amplified
- Initial increase in costs but marginal impact of code will reduce as regulations change and markets adapt