HOMES 2016

Too many blueprints for the home of the future begin from the interior. They should start from the factory, argue Ian Abley and James Woudhuysen

It's 2016. Tony Blair no longer chairs a Cabinet committee on the Thames Gateway development. Forget the 0.12m new dwellings that John Prescott once conceded should be added to Gateway's then 1.6m inhabitants. [1] Instead, a whopping 1.2m homes have been put in over a decade – 10 times what Prescott had planned.

The Royal Society for the Protection of Birds had always wanted not just Rainham Marsh to have nests rather than houses, but also nearby sites. Now, in 2016, it is vanquished. People live right by the Marsh, and enjoy it all the more.

At the London end of the Gateway, protectors of water voles have also suffered defeat. They had objected to plans for building a £60m, 18 hectare business park on Southmere Green, Thamesmead. Indeed, the plans were reported to Brussels in 2004 for their heinous lack of sustainability. But now the business park has been built – indeed, it has outlived the European Commission. Moreover, the people who work there live in homes that have mostly been *manufactured* somewhere else, and then, like computers, *installed*.

In 2016, Gateway homebuyers specify the size and design of each room. They use modified Adobe software and a mix of voice and video over Internet Protocols.

In *volumetric* mode, whole finished rooms, made of steel and concrete, stackable and able to bear loads, are assembled and decorated in factories, then delivered by floating them up the Thames Estuary with the help of powerful Dutch tugs. Once on site, they are assembled by crane. Over marshy ground and at the seafront, the rooms are mounted on stilts. Sometimes, the rooms are clad in the factory; sometimes, on site. Occasionally too, complete concrete- and steel-based houses and small blocks of flats are brought in by giant ferry from Rotterdam.

In *sectional* mode, sections of rooms are made off site in the form of steel or timber frames, and panels to be hung off those frames. Frames and panels are put together on the Gateway site. Sometimes, too, whole blocks of flats are erected with panels that are manufactured off-site in concrete – whether stone-, brick- or fair-faced.

Volumetric or sectional, the kinds of steel, concrete, timber, aluminium and plastics in the Gateway homes of 2016 are technologically advanced. Indeed, these materials often appear as high-performance composites, with sophisticated aesthetic properties to match.

In the Midlands and Asia, house factories hum. Japanese car-making had long revolutionised the Fordian assembly line. [2] By the early years of the 21st century, it had overrun Detroit's Big Three, who were more in the business of consumer finance and employee pensions than in manufacturing. In 2016, Japanese assembly and parts technique has spread to housebuilding and to the interior of China.

Quite a lot of housing CAD, logistics software and customer service goes to India. In places like Vietnam, Thailand and Indonesia, both hardware and software industries support the international housebuilding sector.

Everyone has learnt from Dell – and from its Chinese rival, Legend. New lessons have also been learnt from the Airbus A380 superjumbos put out, from 2006 on, by a 500m assembly line – Europe's largest – at Toulouse. There, 23 overhead cranes make the 555-seater from a single on-line digital model created by 11,000 engineers.

In 2016, the homes at Thames Gateway show that, at last, houses are built under cover, in clean and dry conditions.

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1 As the Office of the Deputy Prime Minister (ODPM) makes clear, the figure of 120,000 new homes for the Gateway area by 2016 is in fact an addition of only 40,000 to old planning targets. See *ODPM Annual Report 2004*, 4 May 2004, p8, posted on www.odpm.gov.uk

2 Byron Olsen and Joseph Cabadas, *The American auto factory* (St Paul, Minnesota, MBI Publishing Company, 2002).

There was a time when $2bn bought Intel a factory making dynamic random access memories. In pre-unification Korea, both Samsung and LG Philips invested $2bn per plant to make flat TVs. Now £150m buys a plant making rooms and integrating third-party building services and appliances into those rooms.

Some of the rooms come with special wallpaper printed in inks made of unbreakable organic light emitting diodes. Result: prefabricated walls devoted to ultra-bright, low-energy, high-definition TV.

BOX 1 **The race for wall TV, 2004**

Between them, Korean rivals LG Philips LCD and Samsung are investing $38bn in TFT-LCD production for flat PC monitors, and for 40inch flat TVs that will cost £1999 next year. But a couple of years back, Toshiba and Matsushita did something more prescient still.

They unveiled 17-inch monitors with screens that were inkjet-printed in organic light emitting diodes. Now Sony and Sanyo plan to bring out OLED laptops this year. Meanwhile, Dow Chemical, Motorola and Xerox have teamed up to use OLEDs to make whole walls the preferred display device for the home. DuPont, Universal Display, Sarnoff and Lucent Technologies have formed a rival team and both Kodak and General Electric are active in the field.

Wall TV is coming. But for its full and inexpensive realisation, it will depend on room manufacture, not room construction.

In CAD, an alliance of Linux, Microsoft, Oracle and Sun Microsystems has brought voice control to three-dimensional building modeling, and allowed whole new types of houses to be conceived and put through virtual manufacture and assembly processes in record time. In rapid prototyping, supplier relationship management, robotics and after-sales service, the achievements of house manufacturers are also beginning to set the lead for other sectors.

Of course, a few whingeing, other-worldly architects still protest that the homes installed over Gateway are all a return to Speer, Stalin, Corbusier, Levittown, T Dan Smith, Ronan Point, Milton Keynes, Pruitt Igoe and the portacabin. But broadly the news is a lot better than that.

Children no longer live with their parents till their 30s, nor do they moan on about how they can't afford that single-person penthouse flat in their 20s. As for New Labour's one-size-fits-all strategy for regenerating cities and creating community, announced in its 2005 election manifesto, it's a distant memory. Risibly, it had insisted on Beacon councils, local Learning and Skills Councils, Business Link pilots, Devolved Administrations, Regional Development Agencies, Elected Regional Assemblies, Regional Planning Offices, Regional Planning Executives, regional Government Offices, and a Regional Coordination Unit – even though Whitehall would have the final say. [3] From the parish pump to the New Deal for Communities, the idea had been that every public service should be subjected to personalisation through participation, with service users co-designing and co-producing and self-organising everything. [4]

No more. In 2016, people like to personalise the new homes, but the homes are so good that people no longer feel obsessed by every design detail. [5] The best thing about the new manufactured

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3 See HM Treasury, *Devolving decision making*, 17 March 2004, on www.hm-treasury.gov.uk/budget/budget_04/associated_documents/bud_bud04_addevolved2.cfm, and the critique by Graham Searjeant, 'Regions will be free to decide how to do as they're told', *The Times*, 14 March 2004.

4 Charles Leadbeater, *Personalisation through participation*, DEMOS and the Department for Education and Skills, 15 March 2004, and on www.demos.co.uk/catalogue/personalisation/

5 Allison Arieff and Bryan Burkhart, *Prefab* (Layton, Utah, Gibbs Smith, 2002).

houses is not that they can be customised; it is their volumes – in both senses of the word.

New Labour repudiated

Back in 2003, Gordon Brown's adviser on housing supply, Kate Barker, declared it neither possible nor desirable to build enough homes to end house price inflation. [6] In 2016, Gateway has proved her wrong. In May 2004, the average price of a house in the UK was £170,719. [7] To sell a home for £200,000 and buy another for £300,000 cost nearly £14,000 for a search, solicitors, surveyors, removers, estate agents and New Labour's notoriously high stamp duties (raised four times since 1997). [8] But in 2016, the million-plus *numbers* of brand new manufactured houses in the Gateway are so great, each one costs, on average, £75,000 fully installed. As a result, people feel free to move as much as to improve.

Gateway has also shown up the old health minister, John Reid. In 2004, he sold 1650 hectares of brownfield NHS land – much of it in the South. Worth £0.4 billion and overseen by English Partnerships, the deal was the biggest sale of state sites ever. Yet it provided for just 15,000 homes, of which only 5000 were designated for nurses, teachers and policemen. [9] In 2016, Gateway alone reveals how petty Reid's approach was.

BOX 2 **Houses by the numbers, 2016**

In 2016, Britain's households have multiplied from fewer than 24m in 1996 to getting on for 28m. [10] Though there are still four per cent more dwellings than households, just the expansion of households in the UK has demanded roughly 200,000 new homes a year over two decades – a higher figure than the faltering site-erected total of 184,000 in 2002-3.

But that's not the whole story, either. The new manufactured homes can never be accused of planned obsolescence: they are designed and built to last an average of 100 years. So for Britain's 28m households to see the housing stock of the nation replenished over the century from 2016 to 2116, UK housing levels must rise by a *further* 280,000 manufactured homes a year.

Altogether, then the annual total of new homes in 2016 is 480,000 a year: a bit higher than Britain's peak post-war output, which hit 413,700 in 1968. Impossibly ambitious? Perhaps. But at the rate of replacement that obtained in 2004, new houses had to last for about 1200 years. [11]

Some housebuyers still worry about buying a 100-year home with a 25-year mortgage. But there is a flourishing second-hand market for manufactured homes, and hopes of hanging on to a home as guaranteed security for the future ended back in 2005, when Blair's housing bubble burst.

The *space* in and around the homes is far from petty. In 2002, Ken Livingstone, London's mayor and prodigal returnee to New Labour, had declared, of microflats: 'What we've got here is

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6 Kate Barker, The Barker review of housing supply – delivering stability: securing our future housing needs – Final Report and Recommendations (London, HMSO, March 2004), para 1.42, p22 and posted on www.barkerreview.org.uk

7 ODPM, 'House price index – May 2004', news release, 12 July 2004, and on www.odpm.gov.uk/pns/DisplayPN.cgi?pn_id=2004_0161

8 Woolwich building society, annual cost of moving research conducted by the University of Greenwich School of Architecture and Construction, 2004, available on www.woolwich.co.uk/default.asp?Content=/content/CRP/recruit/

9 ODPM, 'Land deal to provide more affordable homes', news release 2004/0089, 7 April 2004 and posted on www.odpm.gov.uk/pns/DisplayPN.cgi?pn_id=2004_0089

10 Office for National Statistics (ONS), *Regional trends 38*, 2004, table 3.19, 'Household numbers and projections', and on www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=7678

11 Kate Barker, op cit, para 1.43, p23.

exactly the right size of home for a single person to live in. [12] But the flats he endorsed were 26-33m^2 in size. They were in fact designed to take not one, but *two* occupants. Space was at such a premium that any kind of habitable shed added up to five per cent to the value of an average British house, and a hut on a nice British beach could cost £100,000. [13] Yet, unsurprisingly, nearly two-thirds of first-time buyers had wanted their homes to have two bedrooms; nearly a half rated good parking space highly, and 35 per cent wanted a nice garden. [14]

In 2016 the microflat mentality has been supplanted by macroflats. People need space to work in at home, because millions use broadband to do just that. Yet the new homes in Gateway allow for such habits. They're cheap to buy because they're designed to accommodate households of all sizes and working patterns, and can therefore be made at volumes that bring about real economies.

In the old days, the Campaign to Protect Rural England (patron the Queen, president Sir Max Hastings), which cared 'passionately' about Britain's countryside, had argued against the construction of new houses by calling for 'married couples to stay together with their parents or grandparents in the same dwelling as an extended family for mutual support and care for their elderly members'. [15] But in 2016, grandparents enjoy much more independence than they did in 2004. They live in their own homes, and their homes are large enough.

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12 Jeevan Vasagar, 'Flat pack homes may solve crisis', *The Guardian*, 7 March 2002, available on www.guardian.co.uk/livingstone/article/0,2763,663114,00.html Like Livingstone, the architect Lord Rogers endorses diminutive apartments. He wants high urban densities; a 'network approach' to these, he argues, should include the production of microflats. See Richard Rogers, '"The urban renaissance": the culture of cities', *Europe real estate yearbook 2004*, 2004, p49 and on http://217.67.233.220/index.php

13 Royal Institute of Chartered Surveyors research cited in Robin Young, 'Not so much a monastic retreat, more a valuable ticky-tacky den of vices', *The Times*, 8 April 2004, p5; John Price, 'Shack tactics', *Bricks and mortar*, 9 April 2004, p11.

14 '"Size does matter" to first-time buyers', Alliance & Leicester building society, first-time buyer research conducted in February 2004 by YouGov, April 2004, and on www.alliance-leicester-group.co.uk/non-html/loader.asp?d=media&p=latest-press-releases.asp&s=1

15 *A basis on which to build?* Europe Economics report for the Campaign to Protect Rural England, 25 February 2004, para 2.34, p14 and on www.cpre.org.uk/campaigns/planning/kate-barkers-review.htm

TABLE 1
Household size, Great Britain: distribution in 2003, minimum net habitable floorspace in a decent 2016 manufactured home, and net habitable floorspace in a 2002 two-person Microflat

Household size, persons	**1**	**2**	***2 in a 2002 Microflat***	**3**	**4**	**5**	**6**	**7**
… as percentage of homes, 2003 [16]	29	**35**		15	14	5	1	1
…net habitable floorspace, 2016, m^2								
Three-storey house						98	98	112
Two-storey centre terrace					74.5	85	92.5	108
End of terrace/ semi					72	82	92.5	108
One-storey centre terrace	30	**44.5**		57	67	75.5	84	
Maisonette					72	82	92.5	108
Flat	30	**44.5**	***26-33***	57	70	79	86.5	

In fact the floor areas minima logged here for 2016 are those that were *mandatory* in public sector housing *between 1969 and 1980.* [17] They do not even include the 2.5–6.5m^2 internal storage space that was also mandatory in that era. So the new kinds of manufactured homes in Thames Gateway are the first to return to these standards for more than a quarter of a century. And they have what people want: space to park a car, and gardens too.

16 ONS, *Social trends 34*, 2004, table 2.1 p26.

17 See Patricia Tutt and David Adler, editors, *New metric handbook* (London, Architectural Press, 1979), p305.

What homes could look and feel like

The *designs* that spread across Thames Gateway amuse. Rival manufacturer brands do battle not just with each other, but also with rival 'own label' retailing and banking brands. As months go by, the 2016-issue Will Alsop Toyota Mark 4 two-storey model takes market share from the 2015 Zaha Hadid Asda bungalow. The range of functions, and their integration, amazes. So too do the quality of workmanship, customer service and – importantly – regular upgrades. These houses are giant Apple iPods for their age: powerful, emotionally rewarding, sleek designs, easy to operate, full of personally selected details, endlessly extendable and reducible, endlessly modifiable, but never modular or plasticky to look at.

People like to customise the new homes in Gateway, but their basic size, functionality and design means they don't need to go overboard. After all, fixtures, fittings, finishes and utilities are upgraded annually or biennially. There are thousands of technological options for building servicing, and dozens of technologies to service. Still, the following items are usefully standardised: air-conditioning, skirtingboard trunking for power and IT, and control systems for central heating, central floorcare, servers, remote metering, filtered water, mains gas and electricity, solar power and waste management.

The new homes are also easy to dispose of. As scrap, too, they are relatively valuable.

Houses should be built like cars

'*Houses should be like cars – it's services that are the problem. You buy a boiler, but it's only connected up by trades working on-site. Same with drainage and plumbers.*

'Already America makes wardrobes which dry-clean your clothes in a chamber. Central vacuum cleaning isn't such a good idea – the tube you carry from room to room is heavy, and bumps into things. But it would be quite possible to develop building services using the kind of wiring looms they employ in the aerospace industry.

'The main benefits of considering the house as a mechanical product will lie in better functionality and better reliability. Those things will prove more important than cost reduction. Also, remember that conventional houses waste a lot of energy each time hot water goes down the plughole. A mechanically-built house could have heat recovery systems to change all that.'
James Dyson

What manufacturing could do for buildings

'Product designers could bring new skills to architecture, which suffers a disconnect with the componentry, brackets and fixings that characterise structural engineering. Traditional product designers are good at all that.

'In manufacturing you can now tool up inexpensively for small production runs, using resins for clever panels, sandwiched composites and foams. With mass production technology, you can get a very high quality of build, repeatably, over thousands of units. And houses would be customisable with relatively little effort.'
Dick Powell, Seymour Powell

Trust the people

'British consumers only appear conservative about the exterior aesthetics of their houses out of concern about the resale value of their properties. They take the view that traditional facades will be more desirable to potential purchasers. After all, the British see houses not only as nests, but as nest eggs – investments for the future.

'They may be proved wrong about that. Either way, the interiors revolution that has been led by IKEA over recent years shows that there need be no intrinsic popular hostility to modern prefabricated houses if they are designed right. There will be a growing acceptance of modern domestic aesthetics in the coming years, with further interest in self-expression. If prefabrication can cater for that, all power to it!'
Melanie Howard, Future Foundation

Telecommunications are rich. There is the cable-free WiMax (802.16) standard, pioneered by the 30-mile-reception chips Intel began issuing in 2004. There is wireless broadband, providing for integrated voice, video, data and tools for collaboration on 3.4Ghz, an international standard providing industrial-strength security. And there is 'smart dust': chains of tiny wireless devices, three or more metres apart, that monitor rooms for fires, boilers for end-of-life vibrations, and fridges for continuing use by old people. [18]

Led by a partnership between Italy's Enel and IBM, utilities remotely monitor and advise on household uptake of their services. [19] Computing power is also available on the same on-demand principles, and much of it is also shared over what has become known as the World Wide Grid.

Tolerances are better than those available on site-built homes. Insulation is better, damp and condensation are eliminated, and acoustics are engineered for privacy from neighbours, privacy between rooms, and general comfort within the home. People no longer hear the drains running next door.

For older people, aids to mobility around stairs, chairs and baths come as standard. For worried parents there is room-to-room gating, communications and surveillance. For *fashionistas* the lighting flatters, and there are systems for sorting, washing, tumble-drying, ironing, steam-pressing and dry-cleaning every item of clothing, and for polishing shoes. For home workers there is a concealed printer wherever they want. Bose speakers are available, if invisible, in every room. Altogether, 'built in' has come to mean built under, built behind, built away – to the space-optimising standards of yachts or aeroplanes.

Bathrooms, like kitchens, are free of grouting and so easy to clean. They boast pop-away scales, and pop-away exercise machines for those winter days on which it's too cold to go outdoors. Loos can come made by Japan's specialist loo-makers, Toto, if you really want a high-tech approach to ablutions.

Kitchens have dumb waiter systems to haul in supermarket e-deliveries. They have pop-away freezers, self-cleaning ovens and wall-mounted cupboards that double as dishwashers. Bedrooms have best-for-backs bedding as standard.

Windows are frameless or pre-finished replaceable cassettes, often triple-glazed and ventilated. They have integral blinds, solar and thermal performance films, and self-cleaning surfaces. All come with robust ironmongery, and are fully weather-tested. As for doors, they shut with seals like car doors, and not a few now slide out of the way. Roofs last, air conditioning beats global warming, and right-on fireplaces and chimneys see people through the British winter.

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18 Matthew Boyle, 'Ember: "smart dust"', *Fortune*, 3 May 2004, and Boyle, 'Smart dust kicks up a storm', *Fortune*, 23 February 2004, p34.

19 Tony Barber, 'Enel and IBM enter digital meter alliance', *Financial Times*, 19 March 2004.

No more bogus claims for on-site measurement

In 2016, some housemakers supplying the Thames Gateway still promise too much of their wares. But other claims are more muted.

In 2003, Britain's Constructing Excellence quango issued a wall chart of 10 graphs with which builders could go *measuring* factors such as productivity, profitability and client satisfaction. Eight graphs contained no units of measurement beyond percentage changes on 2002 and 'ratings'. [20] In February 2004, a consortium won a DTI funded five-year contract to produce an 'annual suite' of construction industry Key Performance Indicators (KPIs). What another quango – the Building Services Research and Information Association – called 'The UK KPI hierarchy' looked like this: [21]

Box 2 [22]
Measuring rubble, 2004

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

The rationale was dull but religious. With KPIs, inimitable prose claimed,

> 'Competitors are doing it and reputations are at stake. Clients are demanding it… particularly with more take-up of framework / partnering projects since setting of targets and benchmarking is a key mechanism on such projects'. [23]

KPIs, it was felt, 'highlighted weaknesses'. But in 2016, it is the old obsession with measuring chaos on rainswept building sites that is regarded as a weakness.

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20 Constructing Excellence, *KPIs 2003 all construction*, available on www.constructingexcellence.org.uk/resourcecentre/kpizone/search/details.jsp?id=90

21 Building Services Research and Information Association, 'Measuring performance over next five years', 2004, on www.bsria.co.uk/content/press-download/index.asp?id=147

22 Source: ibid.

23 Ibid.

No more bogus claims for land, public space and design

In 2016 the era of unjustified claims for *land, public space* and *design* is, like that of overbearing KPIs, over. Of course, a few myopic urbanites still form the impression that the world is built up. But sanity has prevailed. After all, in 2002 all the land used for urban, transport and recreational purposes, together with that covered by sand dunes, grouse moors, grasslands and inland waters, took just 16 per cent of the UK's surface area of 24m hectares. Farming took 74 per cent, and forests and woodlands a further 11 per cent. [24] Between 1980 and 2002, indeed, the percentage of land covered by forest in Scotland grew from 12 to 17, in Wales from 12 to 14, in England from 7 to 9 and in Northern Ireland from 5 to 6. [25]

Despite all that, environmentalists used to claim that precious greenfield land in Britain was under attack. Meanwhile the Commission for Architecture and the Built Environment (CABE) [26] published research endorsing New Labour's preference for vulgar economics, vulgar psychology and landscape gardening over house-building.

BOX 3 **Nice views, tree-lined streets, parks, playgrounds: what expert opinion thought well-designed public space was able to do, 2004**

1. Attract companies, customer footfall, employees and services and thus increase the tax take for government, as well as house prices
2. By encouraging public recreation: lower blood pressure, protect cardiovascular systems, enhance the struggle against obesity and Attention Deficit Disorder, raise longevity, make 'substantial improvements' in mental health; reduce the cost of health care to society
3. Increase the ability of children to: manage risks, engage in creative play, have good balance and coordination, and develop inter-personal, social and peer-group skills
4. Allay crime and the fear of crime; provide an unconscious feeling of safety
5. Promote neighbourliness, social inclusion and well-managed festivals
6. Provide the ability to grow flowers and vegetables which, by contrast with the provision of large open spaces, 'significantly affects feelings of community'
7. Improve air quality, cooling, shade and the ability to see foxes at close quarters. [27]

In 2016 CABE is no more. It no longer institutionalises planning inertia, and no longer undermines the role of those elected to grant planning approvals. Instead, what has become clear is that

- Britain's millennial property boom had always been fuelled by New Labour and Green dogma and intransigence
- Officialdom had failed to grant planning approvals to develop land that Britain had always had in abundance
- The magical properties that experts attributed to space and to design were all part of the same myopia.

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24 ONS, *Social trends 34*, op cit, table 11.15, p174. The totals here add up to 101 per cent because data come from a number of sources. Ibid.

25 Ibid, p176.

26 www.cabe.org.uk

27 Helen Woolley and Sian Rose, Sheffield University Department of Landscape, and Matthew Carmona and Jonathan Freedman, Bartlett School of Planning, University College London, *The value of public space: how high quality parks and public spaces create economic, social and environmental value*, CABE, March 2004 and on www.cabespace.org.uk/publications/index.html

In Thames Gateway in 2016, every kind of design still makes a difference to people. But the manufacture of plentiful, spacious, reliable and cheap houses makes much more of a difference.

Manufacturers' licenses and prefabrication principles

Site-based planning has given way to planning for manufacture. To meet the popular demand for manufactured housing, the government runs a heated and nationally televised competition every five years to decide which rival models are to win their makers a license, known as a Type Approval. About 80 Types are successful, assuring market share to those who invest in them. One or two even meet the demand for neo-Georgian squares.

Back in 2002, Toyota made about 3000 houses a year from each of its three housebuilding plants. In 2016, 80 manufacturers, worldwide, run plants with similar outputs, meeting the UK's annual demand for 280,000 manufactured homes, over 80 Types, with a shortfall of just 40,000 units. With each £150m plant making 3000 houses at a cost of £50,000, allowing for a 50 per cent margin before transport and on-site installation, amortisation of initial investment is complete after just a year. Plants typically turn out a new house every hour on two-shift working. Schedules are tough; but each manufacturer can at least plan production for stock, facing only the task of securing enough sales.

England has made big inroads on the 62 per cent of its dwellings that, in 2003, were more than 40 years old. It has begun to say farewell to the six million dwellings classified as 'non-decent' – because they were too cold to live comfortably in. [28] Instead, there's a choice of six different kinds of house to buy:

BOX 4
Six kinds of houses on sale, 2016

1. *Edwardian or pre-Edwardian Antiques*, many of which are given protected status under planning legislation
2. *20th-century hand-me-downs*. These second- or fifth-hand homes, like the Antiques, are prone to endless repair, absentee plumbers and DIY botches. Most were built for fossil fuels and the National Grid – not for home working or the charging of hybrid vehicles. All require planning approval for any substantial works, and many require extensions to keep them habitable
3. *New homes built on site by familiar volume housebuilders*. Here, Britain's building regulations give *approval* for Barratts and others to build standard *types* of house. [29] Yet each home still needs a bespoke planning application for the site it is to go on, which means each can only be built once planning approval is granted
4. *Kit homes* that are based on *frames and panels* and which are *prefabricated in sections*. These are available in various materials, such as the popular but expensive engineered timber kit homes made by Germany's Fertig Haus. [30] Assemblies of room sections, together with integrated components, are bought from a catalogue, compiled in anticipation of planning approval and, to that extent, prefabricated
5. *Whole volumetric units* that are *prefabricated*. These are installed on prepared sites, either as stand-alones or as stacking systems; but they are limited in their production runs by the number that gain site-specific planning approval at any one time
6. *Whole volumetric units* that are *manufactured,* and come complete with *finance packages, manufacturers' guarantees, occasional product recalls and after-sales service*. Here bespoke orders are possible, at a price; but economies of scale grow out of the mass production made possible by a Type Approval approach to planning. As for contractual matters, these are relatively simple: just as a manufactured building is taken back if the customer defaults on paying for it, so the customer stops paying for a house if it's defective.

28 ONS, *Social trends 34*, op cit, table 10.2, p150, and p159.

29 www.labc.co.uk/products/typeapproval/default.asp

30 www.fertighaus.de

Less time for planning permission, more time for research, development and design

In America during the Second World War, typically enough, innovations in house manufacturing and finance, as much as in materials and structures, had been the response to housing shortages. [31] But in Britain in 1947, the Attlee government's nationalisation of land development rights had long stopped people buying new cars and prefabricated house kits and parking them both on a plot of redundant farmland down a B road within commuting distance of somewhere to live and work. [32] In 2016, however, things have changed again.

The right to develop land has not been denationalised, and in the Gateway the masses do not exercise freehold. But neither do house kit prefabricators beg planners that their schemes are sensitive enough to be allowed to slip through the net of Development Control. Instead, government has taken the initiative to promote new house production, rather than simply deny development rights. Prospective manufacturers are awarded Type Approvals, which are renewed every five years. Products must not only get better over time: they must also provide a range of accommodation sizes to suit changing demographics, as well as products that relate to Britain's historic patterns of land ownership.

In the Gateway the variety of house types installed is particularly large, because so much of the land offers a fresh start. There are some awful houses proposed, and some are even built; but with less time spent in the old Deep Green planning processes, there is more time to canvass specialist opinion on engineering matters, and more time to make considered aesthetic judgments, too.

Back in 1999, John Prescott had called for greater emphasis, in UK development, not on labour productivity, but on resource efficiency. 'We need to break the link', he had said, 'between continued economic growth and increasing use of resources and environmental impacts.' [33] By 2004 the link had indeed been broken, as Jonathan Porritt's Sustainable Development Commission reported to Tony Blair that 'unsustainable' economic growth – the kind that led to 'substantial' increases in greenhouse gases – was as dangerous as drug trafficking, sexual exploitation, crime and pornography. [34]

In 2016, by contrast, economic growth has been rehabilitated. There is no trading of guilt and carbon emission certificates among builders. Instead, CAD allows global warming to be prepared for. Against the plans of Greens to flood much of the Gateway area, flood defences have been strengthened, yet with all the hip biomorphic curviness that only CAD can deliver.

For romantics, CAD offers a final escape from the artificial and thus largely linear forms that have dominated architecture for centuries.

There is no more Office of the Deputy Prime Minister. It no longer runs a princely £29m in R&D funding, compared with the £2.5bn at the disposal of the Ministry of Defence (MoD). [35] In 2016, housing is the subject of a much more significant effort, both public and private, in R&D.

Large-scale, big-budget, bespoke and suitably exquisite architectural projects of a non-residential and even of a residential nature still exist. They still struggle to have all materials checked, all performances tested, and all details fully developed before they get to site; but they can also still afford

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31 Donald Albrecht, editor, *World War II and the American dream: how wartime building changed a nation* (Cambridge, Massachusetts, National Building Museum, 1995).

32 Ian Abley, 'Dispersed housing in diversified farmland: making more of time and the abundance of space', paper presented at *Laying siege to toytown*, Aberdeenshire Sustainability Research Trust conference at the Royal Incorporation of Architects in Scotland Annual Convention, Dundee, 17 May 2001, and posted on www.audacity.org

33 Prescott, foreword to *Quality of life counts – indicators for a strategy for sustainable development for the United Kingdom: a baseline assessment* (HMSO, DETR, 1999), p4.

34 Sustainable Development Commission, *Shows promise. But must try harder – an assessment by the SDC of the Government's reported progress on sustainable development over the past five years*, 13 April 2004, paras 35-37, p16, and posted on www.sd-commission.gov.uk/pubs/assessment/index.htm

35 Outturn for 2002-3 estimated by the Office of Science and Technology, 'Net Government expenditure on R&D by departments in real terms, 1987-88 to 2004-05', *Forward look 2003*, table 5, and on www.ost.gov.uk/research/forwardlook03/tables/index.htm

plenty of design time, because serious fees can be spread over a number of specialist consultants. However for small-scale developments the mathematics of the site-built one-off are over. Architects no longer find paid Research, Development and Design (RD&D) time evaporating in disputes with contractors and clients.

So: in 2016, 80 manufacturers of 3000 UK homes retailing at £75,000 spend a modest eight per cent of their sales revenues on RD&D. But, as a result, each Type they have approved has an *annual* £18m-worth of design time spent on it: the kind of money that, at the same level of research-to-sales, is only available on one-off architectural projects that have a hefty budget of £225m.

In the new house manufacturing, 100 architectural specialists, paid an average of £90 an hour, put in 200,000 hours of collective thinking on each model – each year, and every year. By contrast, the £18m RD&D fund on a one-off project that's all over in just five years can support only a fifth as many specialists.

In most cases, only the expiry of a Type Approval ends a manufacturer's continuing efforts at improvement. Still, when a winner of a Type Approval is first fresh from raising capital in the City, it can sometimes front-load RD&D into the pre-production stage and then reduce it during full-scale operations. In that case, a new model that's normally five years in development can have its million hours of design time compressed into 12 months. Once more, houses take their place in a hierarchy of multi-component products built quickly, under cover, and in conditions that are clean and dry:

TABLE 2
RD&D time: getting a new car to market, late 1980s, [36] and building a new house given UK Type Approval, 2016

	Pre-production RD&D, million hours	**Time to market, months**
Car manufacturers, Japan	1.7	46
Car manufacturers, US	3.1	60
Volume car manufacturers, Europe	2.9	57
Luxury car manufacturers, Europe	3.1	64
House manufacturers, worldwide	***1.0***	***12***

36 Takahiro Fujimoto, *The evolution of a manufacturing system at Toyota* (Oxford, Oxford University Press, 1999), pp179–81.

How architects, estate agents and plumbers would suffer

In 2004, Prescott founded a national centre not for disciplined instruction in construction, but for what he was pleased to call 'Sustainable Communities Skills'. [37] More than ever, architects, supported by architectural educationalists, wanted to do many and varied projects, and flattered themselves that they could turn their hand to any kind of building. Forms of contract removed them from responsibility for and control of detailed design development. [38] Instead, architects outsourced details, blithely letting each get lost among a hundred sub-contractors. They preferred to be masters of the midnight oil: in getting staff to win planning approvals not by a meticulous realism, but by dazzling, labour-intensive graphics and dazzling, labour-intensive models. And with only one-offs to divert the egos, no building could boast a continuous development career like that of the 2004 VW Golf – '30 years in the making'. [39]

For all the New Labour injunctions favouring considerate contractors, partnership and teamwork in the mud, subcontractors had little to lose by screwing up: when would they be likely to meet the same angry client again? But eventually, Britain's and the world's better construction firms escaped incompetents by capitalising their production methods. They gained market shares that were out of reach for those who wanted only to invest in excavation and scaffolding. And they made training come as standard.

By 2016, then, the National Centre for Sustainable Communities Skills is no more. Along with construction arbitrators, adjudicators, mediators and lawyers, thousands of architects and subcontractors have lost their jobs. Yet such seismic shifts in employment had happened in other sectors; even in 20th century construction, the knowledge base and sub-disciplines of the industry had gone through many changes. And in 2016, jobs still exist in the continuing market for the refurbishment of old homes, the building on site of one-off new ones, and for landmark workplaces and large-scale cultural developments.

Estate agents are no longer hated: they no longer exist. Homes are instead sold by agencies acting for the manufacturers that hold Type Approval for site installation. As for the £40,000-a-year plumber, he now earns £60,000… but chiefly in stately homes.

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37 www.odpm.gov.uk/stellent/groups/odpm_urbanpolicy/documents/page/odpm_urbpol_029311.hcsp

38 Michael Murray and David Langford, *Architects handbook of construction project management* (London, RIBA Enterprises, 2004).

39 Advertisement, *30 years in the making – The new Golf*, and posted on www.volkswagen.co.uk

The slowing of prefabrication in Japan and the US

Let us now end our sketch of 2016 and return to 2004.

We live in an age of fear of innovation. [40] The red flags that preceded the horseless carriage of the 19th century are no match for the global panics generated by the computer viruses of the 21st. In 2004, then, the same atmosphere of panic surrounds the mere suggestion that manufactured houses should supplement the old sort.

So to do half the things that our best-case scenario has outlined will require a big change in political, economic and cultural patterns – not just in Britain, but also in Japan and America, where house manufacture is much more advanced. For despite all the differences that exist between different national housing markets, prefabrication in these two countries is as backward, and as beset by fear, as the mainstream construction industry there.

Japan has gone furthest toward offering the sixth and highest kind of house for sale that we have projected for 2016 (Box 4): manufactured volumetric units complete with finance packages, manufacturers' guarantees, occasional product recalls and after-sales service. An association of Japanese firms also provides very precisely pre-cut and jointed wooden frames to specifications for traditional houses sent them by everyone from one-man carpenters to major construction firms. [41] Perhaps 800 such firms supply more than half the wooden houses built in Japan. [42]

Japanese off-site production runs, however, tend to be excessively customised, to the point of producing houses that are effectively one-offs. This means that the economic limit of production of volumetric housing is reached with prefabrication, rather than with the manufacture of house types over long production runs. Sectional assemblies and integrated components made off-site are often also bespoke, built as they are through a mix of clever IT and traditional site-based trade skills. [43] Above all, Japanese prefabricators have suffered along with conventional builders from a plunge in housing starts in 1997 and a further decline ever since. In 1992, Japan made more than a quarter of a million prefabs, which took nearly 18 per cent of the market. By 2002 the figure was down to 161,000 units, and market share to 14 per cent. [44] Since then Misawa Homes, a leading manufacturer, has had to have two bailouts from UFJ Bank in as many years. [45]

Even in the US, prefabricators enter the new century in dire straits. The US has proved a stronger economy than Japan over the past decade. It is the land of Buckminster Fuller, who had early appreciated the need to raise output to the level of manufacturing, rather than just prefabrication. [46] Yet in a booming national housing market, US prefabricators have lost market share dramatically. And while their prices remain way below those of site-built homes, price inflation on US prefabs has outrun the more gradual enlargement of the houses being produced. For all the deflationary achievements of US manufacturers of cars and computers, US house prefabricators are raising prices, not lowering them.

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40 In a shameless endorsement of what is happening anyway, the *Economist* sagely declares: 'Blockbuster new products are harder and harder to come by, and big companies can do much better if they focus on making lots of small things better'. See 'Don't laugh at gilded butterflies', *The Economist*, 22 April 2004.

41 www.precut-kyokai.com/precut.html

42 www.cstnet.co.jp/archit/newsRelease/fusezuEngineNewsRelease.pdf

43 James Barlow and Ritsuko Ozaki, *Are you being served? Japanese lessons on customer-focused housebuilding* (Brighton, Science and Technology Policy Research Unit, Department of Trade and Industry, 2001).

44 Japanese External Trade Organization, *HMC Osaka newsletter*, No 70, March 2003, p3 and on www.jetro.go.jp/ip/j/housing/pdf/nl_v70.pdf

45 'Misawa Homes to get bailout', *The Asahi Shimbun*, 31 October 2003.

46 Richard Buckminster Fuller, *Nine chains to the Moon*, first published 1938, first reprint 1963, Feffer and Simons Inc, London, fifth reprint June 1970.

TABLE 3
In America, a prefab slump within a general housing boom

Thousands of shipments and starts, dollar price, square footage and cost in dollars per square foot for new manufactured homes, including installation but excluding land, and for single-family site-built homes, structure only; 1998-2002 [47]

	1998	1999	2000	2001	2002
New prefabricated homes					
Thousands of shipments	373	348	250	193	169
Average sales price, $	41,600	43,300	46,400	48,900	51,300
Average square footage	1,455	1,465	1,505	1,545	1,595
Cost per square foot, $	28.59	29.56	30.83	31.65	32.16
New single-family site-built homes sold					
Thousands of starts	1271	1302	1231	1273	1359
Price of structure, $	147,191	150,362	159,524	164,144	174,140
Average square footage	2,170	2,221	2,265	2,282	2,301
Cost per square foot, $	67.83	67.70	70.43	71.93	75.68

It's true that the inflation of prefab prices in and around a city such as St Louis partly reflects a trend to include bay windows, gable fronts, skylights, built-in bookcases, basements and attached garages. [48] Yet more than half the US prefabricated house industry's factories closed between 2001 and 2003. Output is still falling. Meanwhile, the giant loan-on-property institutions Freddie Mac and Fannie Mae have had to change the criteria on which they lend to buyers of prefabricated homes, so high has been the level of repossessions among them. [49]

Altogether, the crisis in prefabrication in Japan and America serves as striking testimony. It shows just how difficult modern capitalism finds it to take advantage of housing demand by mechanising housing supply into a manufacturing industry based on large production runs and continuous product improvement. [50] It shows the scale of the change in priorities society needs to make if it is ever to house the older people (Japan) and the immigrants (America) of the future.

In Japan prime minister Koizumi has, *à la Thatcher*, enacted year-on-year cuts of 100,000 in homes financed by the government. In America low interest rates and what *Business Week* has termed 're-fi madness' among consumers have made site-built homes a strong alternative to prefabricated ones. In neither country have prefabricators been able to escape from the dodgy dynamics of the housing market.

But when the dodgy dynamics of the housing market are at issue, Britain's prefabricators deserve special attention.

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47 Manufactured Housing Institute, 'Manufactured home shipments vs new single-family site-built housing starts', *Quick facts 2004*, 2004, on www.manufacturedhousing.org/media_center/quick_facts2004/home_ship.html, and US Department of Commerce and Bureau of the Census figures quoted in Manufactured Housing Institute, *Understanding today's manufactured housing*, www.manufacturedhousing.org/understanding_today2004/index.htm

48 Lou Kalosc, 'Larger, dressed-up homes lead manufactured sales', *St. Louis Business Journal*, 12 March 2004.

49 Kathi Schroeder, 'Manufactured home industry struggles with loan defaults, industry issues', *New Mexico Business Weekly*, 28 November 2003.

50 The difficulty lies in large part in getting beyond today's development control processes, which, in the name of urban form and rising property values, insist on short runs of over-customised designs.

Microflats for the military? UK prefabricators

According to the Housing Forum, in 2002-3 about 17,000 of the UK's national total of 184,000 homes were manufactured off-site to some degree. The Forum estimates that the figure will rise to 30,000 this year. [51] For the moment, sectional manufactures far outnumber volumetric ones, and the volumetric specialists are strictly at the penultimate, not the highest level of house for sale that we have projected for 2016 (Box 4). These specialists are still essentially prefabricators of short orders at short notice, not manufacturers of products that are pre-approved, always getting better and the beneficiaries of RD&D that is spread across long production runs. Interestingly enough, though, MoD orders for institutionalised houses for the armed forces provide good prospects for Britain's volumetric firms. Here are Britain's top prefabricators:

TABLE 4
Major house prefabricators, UK, by actual and projected output and mode of prefabrication [52]

Company	**2003**	**2004**	**Category**
Unite Group	8500	10000	Volumetric
Caledonian Systems	4500	6500	Volumetric
Stewart Milne	4000	6000	Sectional
Pinewood Structures	3000	3000	Sectional
Space4	2000	3500	Sectional
Prestoplan	2000	2400	Sectional
Pace Timber	1800	2250	Sectional
Yorkon	1500	1500	Volumetric
Terrapin	1000	2000	Volumetric
Corus Framing Solutions	750	2000	Sectional
Rollalong	350	500	Volumetric
Britspace	300	800	Volumetric
Elliott Group	100	200	Volumetric

Unite Group, the market leader, does not produce family housing. [53] In the manner part-pioneered by the Potton subsidiary Volumetric, [54] Unite makes more or less standardised bedrooms and shared kitchens – pod-like rooms and facilities that stack into blocks for students, nurses and others to live in. Boosted by John Reid's sales of NHS land, Unite aims to become Europe's leading 'modular manufacturing facility', producing a fully-furnished bedroom every 22 minutes.

Claiming that all of its education, health, prison, hotel or barracks buildings are one-off designs for their clients, Caledonian Building Systems refuses to standardise units from one project to the next. [55] The next most advanced volumetric producer in 2003 was Yorkon, experimentally adapting its stacking Portakabin technology for institutional clients such as Peabody Trust. The architectural results, such as at Raines Dairy in Stoke Newington, London, are disappointing, despite ingenious flat-plans by

51 Tim Venables, James Barlow and David Gann, Innovation Studies Centre for The Housing Forum, *Manufacturing excellence: UK capacity in offsite manufacturing* (London, Constructing Excellence, 2004) pp16, 17. The figures almost entirely embrace conventional constructions that are prefabricated, but that would normally be made on site with architectural products. Such constructions are quite distinct from houses so advanced, they can only be manufactured off site.
52 Ibid, p24 and Appendix 5; authors' research
53 www.unite-group.co.uk
54 'The history of Potton', and posted on www.potton.co.uk
55 www.cbuildings.co.uk

architects Allford Hall Monaghan Morris. [56] But in any case, and after some undoubtedly much-needed housing experiments, [57] Yorkon's fortunes may lie elsewhere than in winning architectural awards.

Terrapin [58] and Britspace, which works to a Terrapin design, may overtake Yorkon through a Public Finance Initiative scheme to develop the Colchester Garrison for the MOD, awarded to RMPA Services plc – a consortium between Sir Robert McAlpine, [59] Sodexho Alliance, [60] and WS Atkins. [61] A total of 2600 volumetric housing modules will be supplied, along with training, recreation and welfare facilities for 3500 MoD personnel and civilian staff. [62] The project may not start until later in 2004, and so Terrapin and project partners Britspace [63] will not realise all of that output this year. The 185 hectare development will eventually consist of 141 buildings, with an overall floor area of approximately 237,000m^2, and will be constructed, in two phases, over about four years.

Similarly, Corus may go beyond the prefabricated units of its sectional Framing Solutions business into the manufacture of volumetric units. Corus Living Solutions aims to produce highly standardised, volumetric housing for the MoD. [64] In July 2004 Corus started up an entirely new manufacturing production line at the Shotton Works, Deeside, Flintshire, in Wales**.** Taking equipment previously used by German timber frame prefabricators and adding its own, the company hopes to start by building 3000 volumetric units a year – chiefly, but perhaps only initially, for barracks, nursing homes and hotels.

The Shotton production line is engineered to do things that are impossible to do on site. For example, it reduces the number of joints in its assemblies by using very large board materials, handled with automated lifting equipment. The boards come to it straight from mills, uncut.

If these prefabricators deliver on their promised increase in output, thanks to contracts from every government agency except the Housing Corporation, the UK's capacity to make volumetric housing may be higher than the Housing Forum estimates. However, much of the extra output will be stackable, institutional microflats that require architectural completion on site. Much will not be destined for the civilian population.

Elsewhere in Europe, pre-cast concrete housing systems maintain a significant market. But in Britain Project Meteor, a heavy concrete volumetric system pursued by Arup engineers through director John Miles, remains at experimental stage. [65] It is notable that, in the UK residential sector, no frame-and-panel kit homes, made in sections, are prefabricated in concrete today. That needs to change – particularly for high rise, higher density developments in which technologies based on light steel or timber do not suffice. [66]

One firm that has no production capacity itself, but which purchases and marks up the output of those who do, is LiveIn Quarters – the company that demonstrated a pair of microflats at the Ideal Home Exhibition in 2002. [67] Spaceover is another. [68] It buys in volumetric units from up-and-coming producers like Rollalong. [69] Spaceover also seems prepared to take interest in the output of new players

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56 www.ahmm.co.uk
57 Ian Abley, 'Economy of scale required', case study in Ian Abley and James Heartfield, editors, *Sustaining architecture in the anti-machine age* (Chichester, Wiley-Academy, 2001) p 216 to 217.
58 www.terrapin-ltd.co.uk
59 www.sir-robert-mcalpine.com
60 www.sodexho.co.uk
61 www.atkinsglobal.com
62 Press Release, 'Garrison goes off-site – Joint Venture between Sir Robert McAlpine and Terrapin for UK's largest off-site construction development', 11 March 2004, and posted on www.terrapin-ltd.co.uk
63 www.brbs.co.uk
64 www.coruslivingsolutions.com
65 www.arup.com
66 It is also true that, on low rise, high density developments, heavy steel and concrete are generally uneconomic compared to lighter structural approaches.
67 James Woudhuysen and Ian Abley, *Why is construction so backward?* (Chichester, John Wiley & Sons, 2004) p76.
68 www.spaceover.com
69 www.rollalong.co.uk

like Modway. This company, formed in 2002, has set up a facility at Dunsfold Park, Surrey, and plans to win an annual turnover of £20m within three years.

It is claimed that two men working on a one-bedroom Modway apartment take only120 hours from start to finish. Apartments can be built up to four storeys high and, excluding land, cladding and roof, cost from £20,000 for one bedroom and £25,000 for two. [70] Speed of delivery to prepared foundations and services, together with low cost, makes the concept ideal for grouped quarters in the hotel sector, in education, the health service, the prison service, the emergency services and the military. Once again, these are volumetric elements that are completed with bespoke, planning-approved architectural treatments built around them on site. Once again, they are combined to form larger building types, such as travel lodges, halls of residence, nurses' or retirement homes, detention units, police, fire and ambulance stations… or barracks.

In sum: the crisis in Japanese and American prefabricators is mirrored by the parsimonious and regimented approach required of British ones. At the Department for Education and Skills, for example, suitably unimaginative plans exist for a Yorkon programme of architecturally dressed-up primary and secondary schools. [71] Given that British teachers have for decades held far too many classes in portacabins, these kinds of plans should be overturned.

Conclusion

In February 2003, an Office of the Deputy Prime Minister select committee on affordable housing concluded that, after what it called 'past disasters', it would be 'rash to encourage more than a modest increase in off-site production'. [72] Today, a cynic might equally argue that the recent slowing in Japanese and American prefabrication shows how house manufacturing is ruled out as a serious contender for the 21st century.

Yet, however utopian our sketch of Thames Gateway and 2016 turns out to be, it is not as utopian as those who believe that UK housing can go on in the old way. While her report on housing supply was notably more caustic than most, Kate Barker's famous apologia for the rather cautious belt-tightening of the Bank of England's Monetary Policy Committee – 'We are targeting inflation, not house prices' – may not convince for very much longer.

In rented accommodation, landlords may have to endure the great Buy-to-Let Bust in 2006 or even sooner. Shortly after that, perhaps, the Great British House Price Fever will pass. Proper houses will still be too few and too expensive; but despite being cheaper, they will probably be less affordable than ever.

Higher interest rates will see to that. In a recent paper, Oxford university's Andrew Farlow has suggested that, for Britain and all other industrial countries, the long-run course of national and regional house prices is determined by incomes, real interest rates, housing stock, demographic changes, credit availability and tax structure. [73] But as Barker rightly pointed out, in Britain's case the planning system also has much to answer for.

Until and unless it is overturned, the crisis of British housing can only get worse. If it won't set freeholders free, the state needs to take responsibility for the development rights it has nationalised and establish a democratic system of Type Approvals to allow manufacturers to plan their investment, RD&D, and production. Now is the moment for British architects, designers and anyone who wants to end the development control madness to put forward new solutions. It is time to ask those who would defend the status quo: just what do you have to offer as alternative?

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70 Press Release, Dunsfold Park, 'Modular housing takes shape at Dunsfold', 3 November 2003, and posted on www.dunsfoldpark.com

71 'Schools face "dumbing down"', *Building Design*, 2 April 2004, p1.

72 Quoted in Mark Beveridge, 'Stop using prefab – it's not the answer, says select committee', *Housing Today*, 7 February 2003, on www.housingtoday.co.uk/story.asp?storyType=7&sectioncode=306&storyCode=1025189

73 Andres Farlow, *UK house prices: a critical assessment*, Credit Suisse First Boston, January 2004, p5, and on www.economics.ox.ac.uk/members/andrew.farlow/Part1UKHousing.pdf

What we propose may sound drastic. But right now Britain is a country of dilapidations. Official housing dogma in the UK prejudices the ability of future generations to meet their housing needs.

Britain has the design talent to do better. All those who want simply to continue in the old way must – and will – be held to account for their inaction.

The future will see to that.

James Woudhuysen and Ian Abley are authors of the book *Why is construction so backward?* (Wiley, 2004). Go to www.audacity.org

BOX 5 **Huf Haus shuffle**

Beyond the scale of volumetric toilet or bathroom pods now common in commercial property, imported housing systems are invariably lightweight and sectional and not volumetric. But the positive public reaction to the £495,000 Huf Haus, featured in Kevin McCloud's *Grand Designs* series on Channel 4, shows how sectional systems – in this case, a post-and-beam one – can be popular.

While the structure of the house was being built in the German factory, a team arrived in Surrey and laid concrete and steel foundations. In the summer, the house arrived on several enormous trucks, accompanied by five workmen, scores of specialist tools, and an incredibly ambitious schedule of just six days for the precision engineered frame, panels, glazing and roof to be up and watertight. The ground-floor levels had to be millimetre-perfect or the upper floor, with balcony and sloping eaves, wouldn't fit. The team had decided they wanted to be back in Germany for the weekend, so they brought in an extra two men. By the end of the fourth day the shell was complete. The wiring and plumbing was a longer job, but thanks to the thorough design and precise manufacture, it was all completed in five weeks, ready for decoration. [74]

After the television programme the Huf family, its architect and engineer Peter Huf now based in Leatherhead, is out to establish the firm in the UK. [75] There is no reason why an architecturally stylish volumetric approach, in which services and decoration are completed off-site, could not be met with an equally enthusiastic response.

BOX 6 **Progress at Piercy Conner**

Piercy Conner has designed microflats far more stylish than most. [76] But their flats do not amount to family housing. [77] In 2004 Piercy Conner has also proposed 'Recycling Suburbia' – as a prefabricated extension to existing housing. This imaginative and unbuilt proposal for a free-standing structure, engineered by Price & Myers extends rooms at existing floor levels and provides new flat accommodation within and above existing pitched roof structures. The façade is faceted to create views and can be finished in a multitude of cladding types – including printed ones. While he wants volumetric construction, Stuart Piercy appreciates that the project might be better sectionalised, the more the site-based adaptation of the existing buildings is required.

BOX 7 **A Rogers odyssey: from Zip-up House to Korean eco-container**

Richard Rogers designed his spacious Zip-up House in 1968, putting the design on show at the 1969 Ideal Home Exhibition. It offered housing choice, low costs of construction, building, maintenance and operation, and a high degree of environmental control. 'Zip-up' described a mass-produced panel system for roof and walls that, using gaskets like zips, could be rapidly assembled into 'rings', providing a maximum 9m clear structural span. Within, there were no fixed divisions, so the interior layout could be rapidly changed and the house extended simply by adding more sections. Adjustable legs would allow Zip-Ups to be sited anywhere, or easily relocated.

Thirty years later, in 1998, the Richard Rogers Partnership proposed a very different kind of prefabricated unit. Skilfully engineered by Arup though it was, [78] the Rogers design for Korean Industrial Housing was for a micro – 27m^2 – container. Its aim? To have a 'minimal impact' on the undeveloped countryside of Korea. [79]

74 www.channel4.com/life/microsites/0-9/4homes/grand_designs/hufhaus.html
75 www.huf-haus.de/en/
76 www.piercyconner.co.uk
77 Ian Abley, 'Tied microflats are an employment trap for 'key workers' ', and posted on www.audacity.org/IA-11-14-2002.htm
78 www.arup.com
79 www.richardrogers.co.uk