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A question of scale: assessing Communal Rainwater Harvesting

A presentation by
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..... helping to make Rainwater Harvesting affordable

Introduction

Good afternoon to you all. It's good to see such a wide selection of interests represented in this room.

- I am going to talk to you today from the perspective of an Architect with housing design experience, including very recently the design of a zero carbon dwelling, incorporating rainwater harvesting.
- Although the retrofit market offers considerable scope for water efficiency, my presentation will focus on new-build homes.
- The information given in this presentation is based on the current position in **England**, where higher level water efficiency targets are being implemented in a very fragmented way.
- Scotland, Wales and Northern Ireland have slightly different approaches and timescales. >>

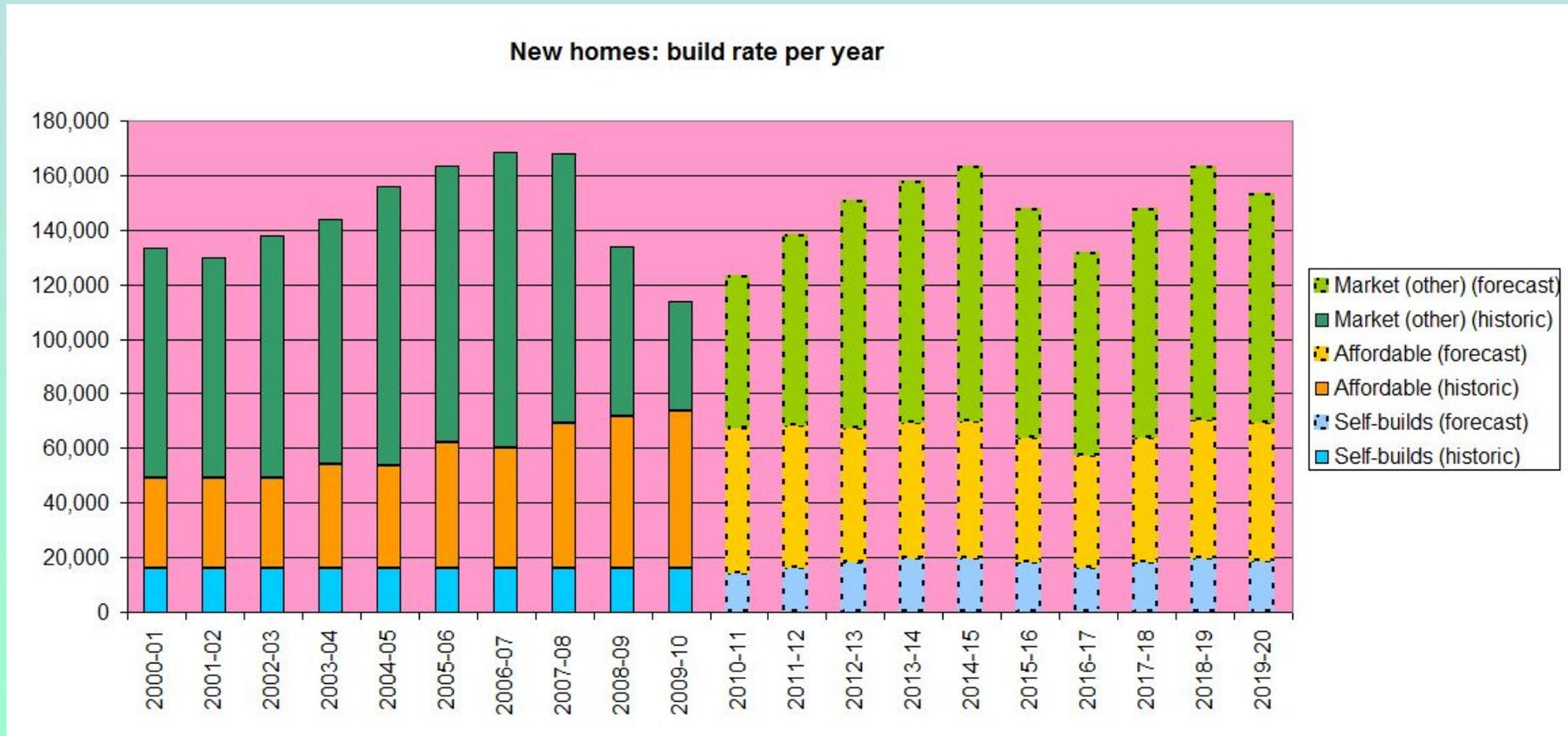
Why is this subject of interest to an Architect?

- In 2006, I designed a scheme of 38 dwellings:
- Topographically speaking, the site was a basin, and all fluids would end up at the bottom and have to be pumped out.
- It seemed to me that pumping the surface water for use in people's toilets would be a sustainable idea; however, the developer's reaction was:
- "We don't have to do this, so, guess what.....?"
- I began to think that here is a problem needing a creative solution..... >>



- I will come back to the question of developer's motivation later, but let's now consider the scale of market opportunity for manufacturers and installers. >>

Scale: market size for new homes, England

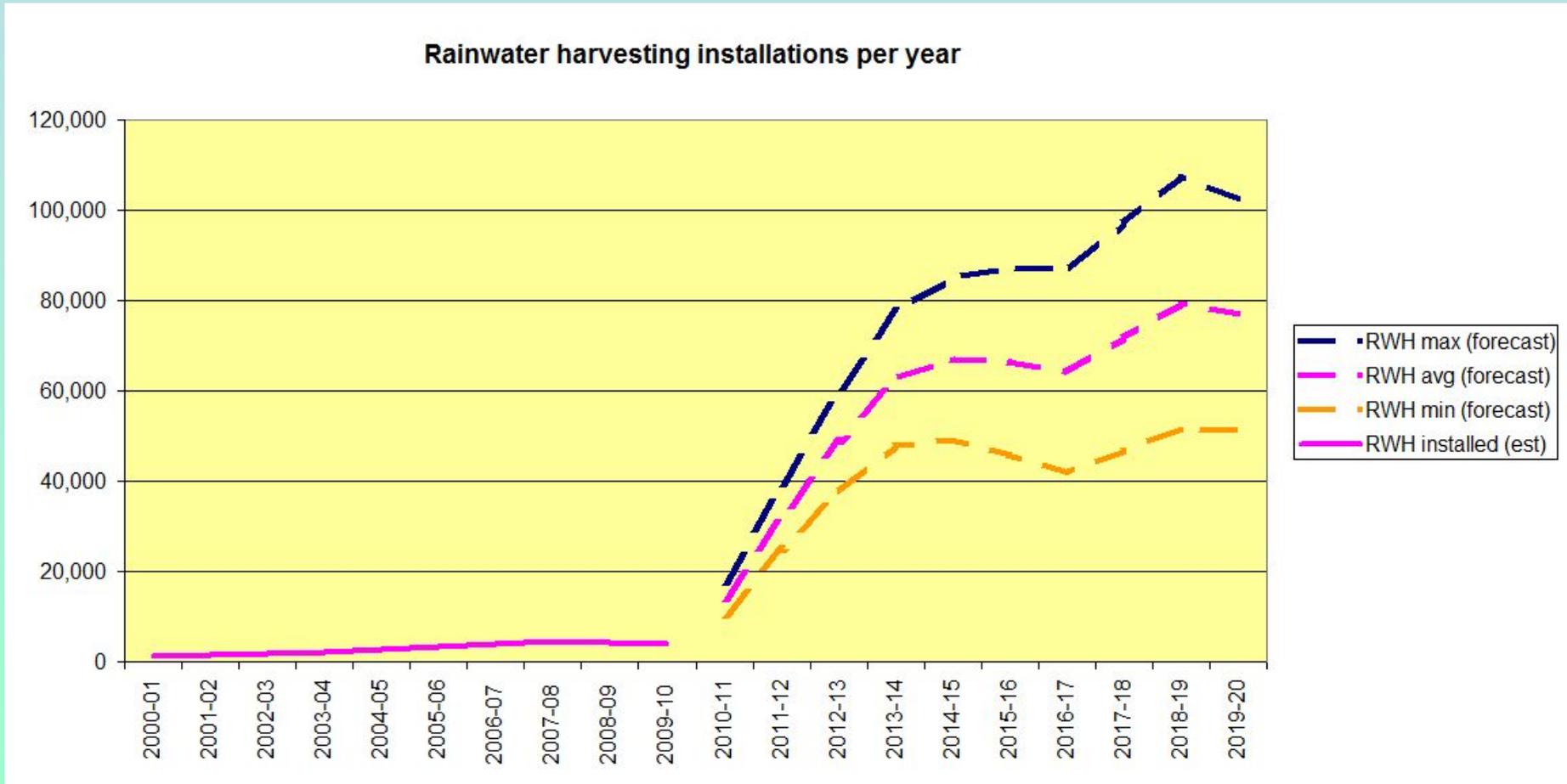


The housing market is in turbulent times. Market uncertainty, changes in Government funding and Planning Policies make any projections very difficult for any forecaster, but we do know that projected household formations are expected to average 159,000 / year* for some years to come.



*Sources for figures: DCLG, HMRC, crystal ball

Scale: market size: homes with RWH / GWR

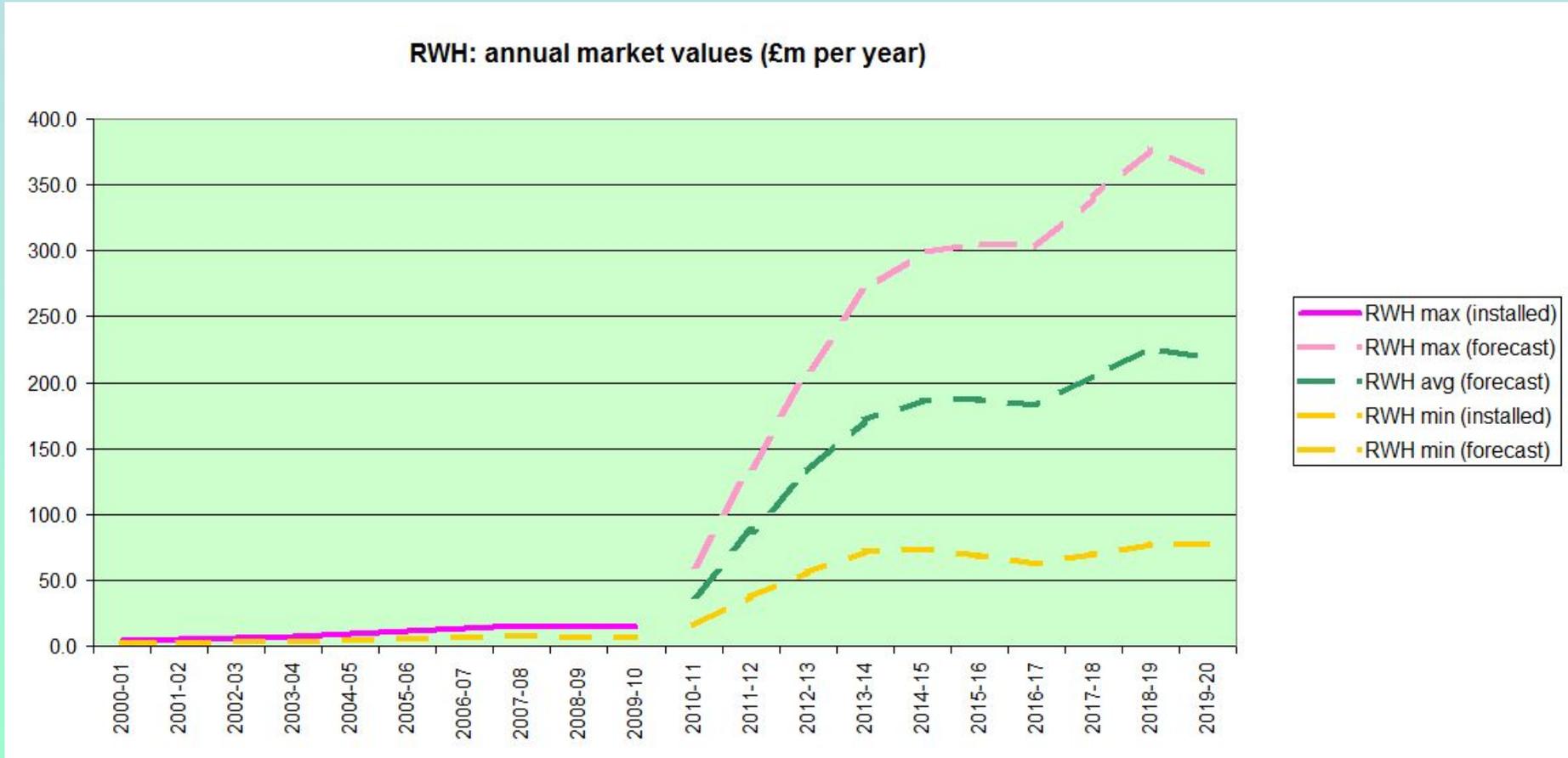


This graph takes the previous housing projections, and applies separate potential RWH / GWR implementation levels for affordable homes, self-build homes and other market homes. >>

We'll have a look at values next. Note: all costs in this presentation are on a current price basis. >>

Sources for implementation levels:UKRHA, DCLG, crystal ball

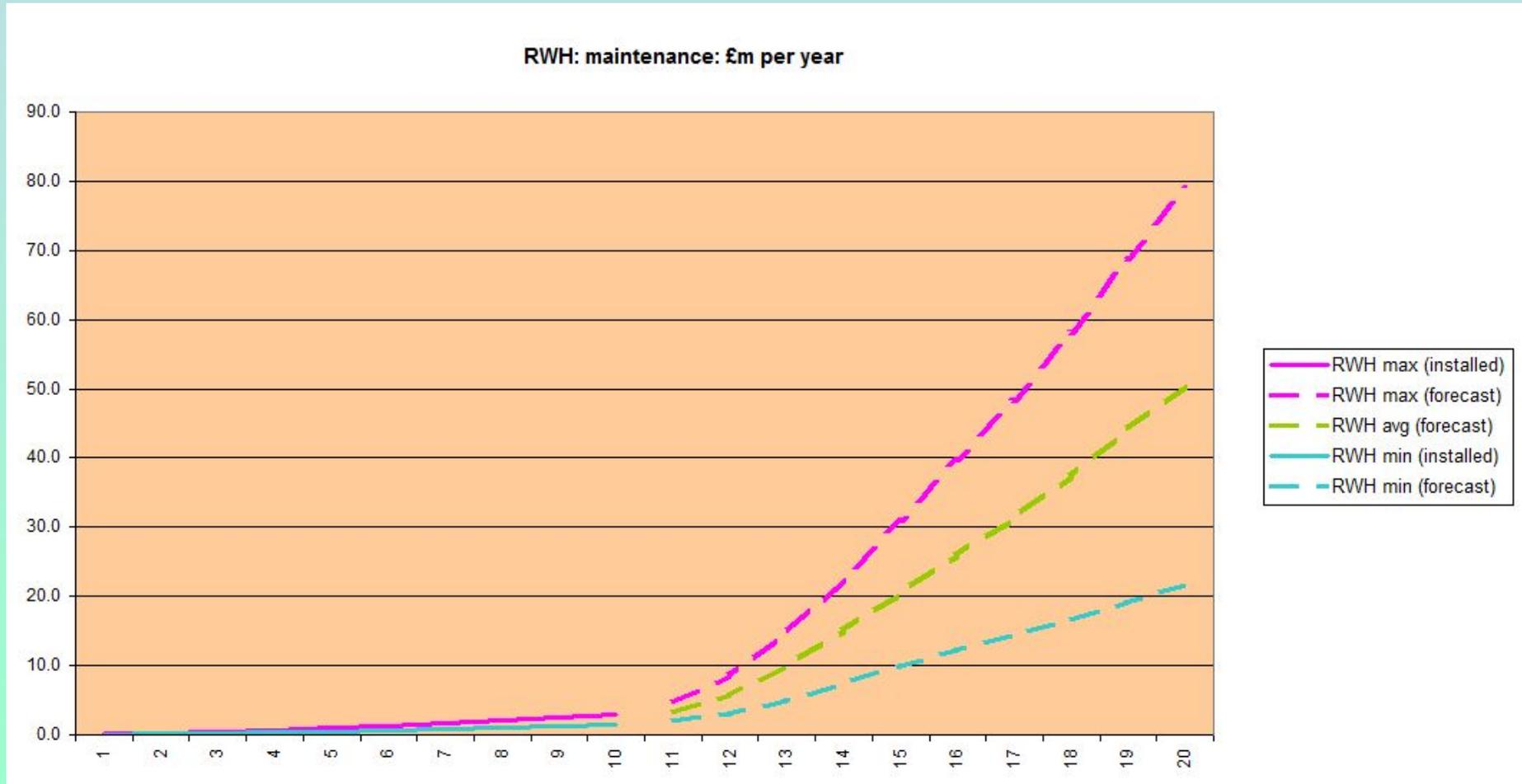
Scale: market value for RWH, England



This graph takes minimum and maximum installation costs, of £1,500 and £3,500* respectively, and applies them to the anticipated minimum and maximum installation levels used in the previous graph. With a maximum cost of £4,500* for GWR, the top figures above would increase further. >>

*Source for costs: Davis Langdon

Market value: maintenance of RWH / GWR

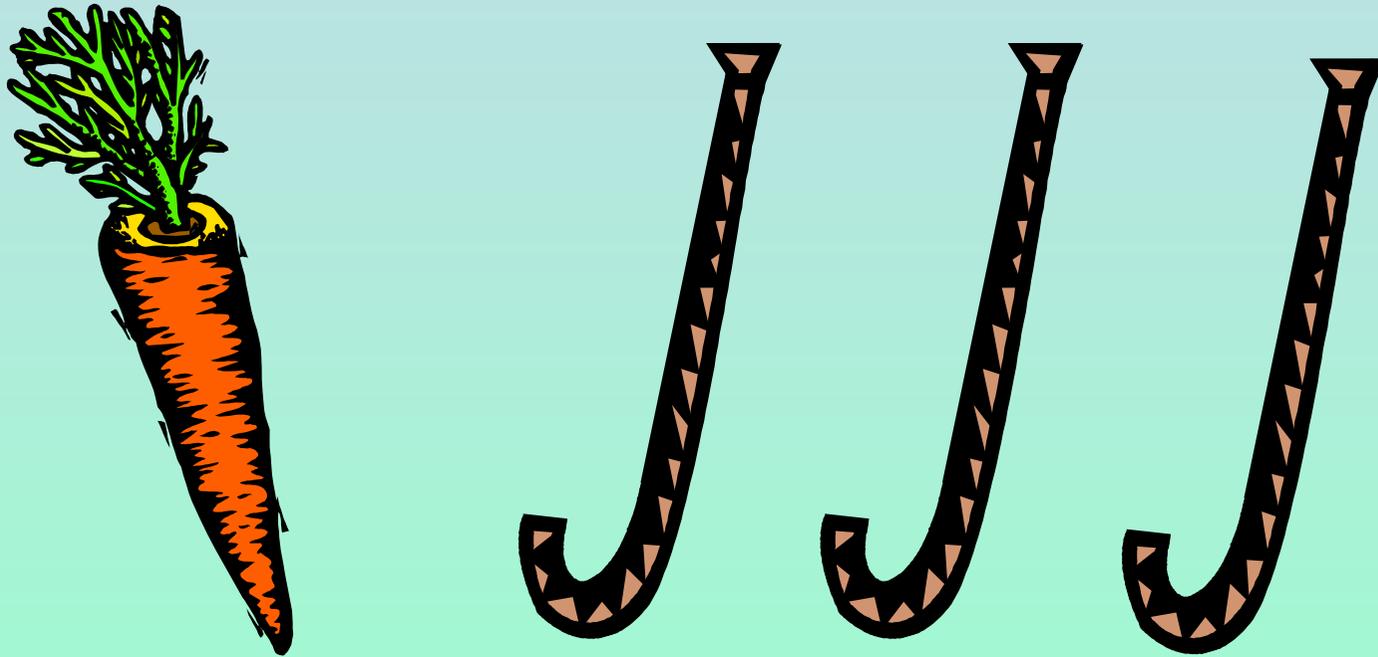


This graph takes a yearly maintenance cost of £50 - £100* per dwelling and applies these to the cumulative minimum and maximum number of dwellings where RWH /GWR would be installed.



*Sources for costs: R Roebuck and Davis Langdon

Motivation for homebuilders



We see plenty of sticks for this market

.....but no carrots !!!

Homebuilders are being asked to add £1,500 - £3,500* more to their build cost, with little scope to recover this through property price increases. >>

* Source for costs: Davis Langdon

Let's look at the sticks in more detail

- Developers and their designers are faced with having to meet a variety of water efficiency targets, depending on dates and location. For houses, the biggest challenge is CfSH levels 5 and 6, where the target can only be met by including a full RWH & / or GWR system. >>
- Code level 6 will be mandatory for all affordable homes from 2016.
- For market homes, the good news for developers is that the water efficiency targets under Code levels 5 and 6 will not be mandatory everywhere. It will depend on:
 - the relevant date under the Building Regulations
 - local Planning regulations
 - and possibly site acquisition terms >>
- On mixed tenure sites, separate targets will often apply to the affordable and market homes. >>
- The fragmented phasing in of mandatory requirements by the 353 local Planning Authorities in England will make it very difficult for water companies and RWH providers to plan for growth.
- Developers and their designers will be confused by the lack of a universal approach. >>
- Let's now think about where the money might come from..... >>

Will consumers value the inclusion of RWH?

- I think a wider question is probably more relevant:
 - Will consumers value sustainability generally?
- Banks, building societies and their valuers are very conservative by nature, and probably much more conservative at present, when there is a much greater emphasis on risk management.
- The anecdotal evidence so far is that these bodies and hence homeowners are unable to fully recognise the value that sustainability features bring to the new homes market.
- All will no doubt come good eventually. In the meantime, market pricing inertia needs to be rapidly addressed, and can only be overcome by government intervention, in the form of sustainability marketing, and through subsidy. >>

Where else could the money come from?

- It has been reported to Government that achieving Code level 6 (the zero carbon level) will cost an additional £19k to £47k per dwelling. By any measure, that's a lot of money.
- Of that, the cost of RWH would be between £1,500 & £3,500*.
- That is equivalent to around 7.5% of the extra costs. >>
- In considering how we as Architects could help homebuilders to mitigate their additional costs, I came up with the following ideas:
 - if you collect rainwater communally, you can sell it to householders
 - and if you do that, the revenue might cover the maintenance costs and the capital costs
 - installations could be undertaken by specialists on a design, fund and build basis, followed by maintain, or adopt & maintain >>
- In reality, the likelihood is that RWH will not be completely self-funding, because water is too cheap, and therefore a subsidy mechanism will most probably be needed to address the shortfall.
- The level of shortfall will depend on individual site circumstances. >>



*Sources for costs: DCLG, Davis Langdon

What regulatory changes are needed to enable charging for non-potable water?

- If implemented, the supply of chargeable non-potable water through Communal Rainwater Harvesting would require regulatory changes to deal with issues around: >>
 - dual-metering
 - billing
 - payment
 - adoption
 - maintenance
 - infrastructure charges
 - and possibly subsidy, through a feed-in type tariff >>
- Some of the above still need to be properly addressed for non-communal installations.
- Subsidy has been used in various countries for some greywater installations. See:
 - “Overview of Greywater Reuse: The Potential of Greywater Systems to Aid Sustainable Water Management”: November 2010, published by the Pacific Institute
- Subsidies for RWH exist in other parts of the world. >>

Are further regulatory changes needed to support RWH, GWR and SUDS?

- The default position for unmeasured surface water on new housing developments is that this is included in householder billing irrespective of the configuration actually provided on site for the disposal of surface water.
- Given the new complexities that will occur in future installations (SUDS + RWH + GWR), we advocate a new approach to unmeasured surface water:
 - Once the foundations and drainage have been installed, the independent professional inspecting the works under the Building Regulations, will have seen the water management configuration provided, and could certify accordingly. >>

What scale of RWH will be appropriate?



The scale will be determined by a long list of key site factors:

- topography >>

Other factors include:

- rainfall and flood expectations, with climate change factored in
- soil conditions, including contamination, where present, and permeability
- aquifer and watercourse implications
- water services infrastructure capacity
- the local water company's tariffs
- the number and types of dwellings proposed, including storey heights
- and possibly: water hardness >>

Our expectation is that there will be thresholds where particular solutions (such as single RWH, communal RWH, RWH + GWR, etc) and various levels of subsidy will be appropriate. These thresholds need to be urgently determined, in relation to all of the above constraints. >>

Is further research needed?

- Homebuilders, their engineers and designers, and Planners need a clearer path to an appropriate solution for any given site.
- A freely available “water solution selector” website, pulling together all the key information, leading to a small range of alternative solutions after completing a brief questionnaire, would save many people from having to reinvent the wheel. At the same time, having a consistent method could: >>
 - avoid disagreements during the Planning process
 - determine any subsidy needed
 - and determine the appropriate infrastructure charges >>
- Infrastructure funders will need to understand how this market will work for them, so that they will have the confidence to lend money into it.
- We will need to listen to funders, and address their concerns, so that this technology is fundable and can be deployed to maximum effect.
- The market itself needs a clearer picture on the size of the market and methods of implementation so that it can have the confidence to gear up to deliver this important technology. >>

The research team

- To undertake the necessary research to implement chargeable grade B water, whether through rainwater or greywater solutions, Hasker Architects have teamed up with the following:

ARUP

Davis Langdon 
An AECOM Company

UNIVERSITY OF
EXETER
Centre for Water Systems

waterwise

- We are seeking sponsorship from interested parties in the private sector, with a view to obtaining match funding in 2011.
- If your organisation is interested in providing funds towards this exercise, please talk to myself or a member of our team during the break. >>

Conclusions

- If we do nothing, developers will be faced with having to spend £1,500 - £3,500* per dwelling (or £4,500* if you include greywater recycling) to achieve the water efficiency targets under the CfSH levels 5 and 6.
 - **Where will this money come from? >>**
- On a site we are designing, the developer could be faced with spending £3k - £7k* on engineer's fees just to prove to the Planners whether we need to provide this kit or not.
- With that money, the kit could have been installed!!
- Some common sense is needed here to cut out the chaff and focus thinking and expenditure on the essential, desired and sustainable outcomes.
- Developers are not in business to undertake a personal philosophical journey on every development, or even on one. There is equally little benefit in the 353 local Planning Authorities in England undertaking a similar detailed checking exercise on every planning application.
 - **Where will the money for all these fees come from? >>**
- Where is the freely available information that Architects, Engineers, Planners and developers need to make consistent and properly informed decisions on this subject?
- How can water companies properly plan for future water demand and outflows? >>

*Sources for costs: Davis Langdon, Hasker Architects

Conclusions.....continued

- My expectation is that selling grade B water would create a revenue stream that could cover the maintenance cost and part of the capital cost.
- For some sites, we might get the capital cost down to £500 per dwelling (who knows; that's why we need the research). But, this is a funding deficit. Wherever the site is, and whatever the constraints, there is always likely to be a funding deficit.
- That money may have to come from the government, landowners, water companies, or householders.
- But additional water infrastructure capacity is still needed, and additional sewerage infrastructure may also be needed. Future infrastructure charges to developers will need to be appropriate to what is provided on site, and be charged correctly to consumers from the outset. Independent certification should be provided by Building Inspectors.
- Decision-makers already have information overload, and yet: concise, freely available, mature information on this subject is conspicuous by it's absence.
- Much more research needs to be done, and soon. >>

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Thank you very much for listening.

For anyone interested, copies of our Research Scoping Document are available on request.

Please come and talk to us about funding the necessary research!!

Does anyone have any immediate questions?

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