Household Projections for Wales
Household Projections for Wales - Seminar Outline

- Background
- Methodology
- Results
- Local Authority Perspective
- Outputs
- Feedback
- Current / Future Work
Household Projections for Wales

Background
History

• Household projections produced:
  – for DCLG and predecessors
  – by Anglia Ruskin University under contract
  – based on GAD Marital Status Projections

• In 2007 the latest published projections were:
  – 2003-based
  – only available at a regional level within Wales
Key Developments

• End of Anglia Ruskin contract
• CLG Methodology Review (November 2007)
• First local authority population projections for Wales (June 2008)
  – 2006-based
  – Did not sum to national projection (‘Bottom up’ approach)
Household Projections Project – Initial Stages (early 2008)

- Literature review of methods in use
- WASHP working group set up
  - Similar membership to WASPP
  - Mainly local authority researchers
- User Consultation June 2008
Consultation Responses

- Regional geography not useful
- Update projections every two years
- Estimates and projections broken down by household type
- Household type defined by size and presence of children
- Variant projections needed
- Make source data and model available
Household Projections Project – Intermediate Stages (late 2008)

- Source data obtained
- Agreed use of commissioned Census data
- Various methods considered
- Agreed key elements of methodology agreed, i.e.:
  - Membership method
  - Household typology
  - Method for projecting rates
## Household Projections Project – Final Stages (2009)

- Annual Population Survey data excluded
- Household Estimates methodology agreed
- Software commissioned
- Results produced and published
- Household Estimates published
- Guidance Leaflet, FAQs published

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**Y Gyfarwyddiaeth Ystadegol**
Statistical Directorate
Household Projections for Wales

Methodology
Projection Methods Considered

• Average Household Size method
• Headship method
• Membership method
Methodology – Key elements

• Membership method
• Household types based on size and presence of children
• Census data and two point model to project membership rates
• Results broken down by household type
# Age Bands

<p>| | |</p>
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<td>5-9</td>
<td>45-49</td>
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<tr>
<td>10-15</td>
<td>50-54</td>
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<td>16-18</td>
<td>55-59</td>
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<td>19-24</td>
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<td>25-29</td>
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<td>30-34</td>
<td>75-84</td>
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<tr>
<td>35-39</td>
<td>85+</td>
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### Household Types

<table>
<thead>
<tr>
<th>Household Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>1 person</td>
<td>4 person (no children)</td>
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<tr>
<td>2 person (no children)</td>
<td>4 person (2+ adults, 1+ children)</td>
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<tr>
<td>2 person (1 adult, 1 child)</td>
<td>4 person (1 adult, 3 children)</td>
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<tr>
<td>3 person (no children)</td>
<td>5 + person (no children)</td>
</tr>
<tr>
<td>3 person (2 adults, 1 child)</td>
<td>5 + person (2+ adults, 1+ children)</td>
</tr>
<tr>
<td>3 person (1 adult, 2 children)</td>
<td>5 + person (1 adult, 4 + children)</td>
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</table>
The Membership Method

• Formula: $h_i = \sum_{t=1}^{t=12} \left( \sum_{ag=1,M}^{ag=16,M} \frac{(pop_{agi} - comm_{agi}) \cdot y_{agti}}{size_t} \right)$

where $h_i$ = total households in year $i$
$t$ = household type
$ag$ = age and gender group
$pop_{agi}$ = population in age and gender group $ag$ in year $i$
$comm_{agi}$ = communal establishment population in age and gender group $ag$ in year $i$
$y_{agti}$ = membership rate for age and gender group $ag$ and household type $t$ in year $i$
$size_t$ = household size for type $t$
Private Household Population

- Total Population minus Communal Establishments Population
- Data on Communal Establishments from 2001 Census
- Number aged under 75, Proportion aged over 75 held constant
Membership Rates

• Data from 1991 and 2001 Censuses
• APS data not suitable
• Two point exponential model as a result:

\[ y_i = k + ab^{x_i} \]

where \( i = \) the year

- \( y_i = \) membership rate in year \( i \)
- \( k = 1 \) if \( y_{2001} \geq y_{1991} \)
  - 0 if \( y_{2001} < y_{1991} \)
- \( a = y_{1991} - k \)
- \( b = (y_{2001} - k)/(y_{1991} - k) \)
- \( x_i = (i - 1991)/(2001 - 1991) \)
Factors affecting Membership Rates

- Age & Gender
- Income
- Housing Stock
- Health
- Interest Rates
- Aspirations
National and Local Projections

• Method applied to national and LA population projections

• LA Results not constrained to national ones
Household Projections for Wales

Results
Projected Households, Wales

Source: 2003- and 2006-based Household Projections for Wales
Projected Household by Type, Wales

Source: 2006-based Household Projections for Wales
Average Household Size, Wales

Source: 2006-based Household Projections for Wales
Projected Total Population, Wales

Source: Government Actuary’s Department
Wales Results - Summary

• 25% increase in household numbers 2006-2031
• Most common household types:
  – 1 person (2031)
• Average Household Size projected to decrease to 2.03 persons in 2031
• Overall % Change By Household Type:
  – 76% increase in 1 adult, 1 child households
  – 37% decrease in 5+ person households with 2 or more adults

Source: 2006-based Household Projections for Wales
Percentage Increase in Households, 2006-2031

Source: 2006-based Household Projections for Wales
Projected Households by LA

Source: 2006-based Household Projections for Wales
Projected Households by LA

Source: 2006-based Household Projections for Wales
Projected Households by LA

Source: 2006-based Household Projections for Wales
Projected Households by LA

Source: 2006-based Household Projections for Wales
1-person households as % of all households
2006-31

Source: 2006-based Household Projections for Wales
1-person households as % of all households
2006-31

Source: 2006-based Household Projections for Wales
1-person households as % of all households
2006-31

Source: 2006-based Household Projections for Wales
## Overall Change in Household Numbers, 2006-31

<table>
<thead>
<tr>
<th></th>
<th>Population Effect</th>
<th>Rate Effect</th>
<th>Total Change</th>
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<td>2,931</td>
<td>2,208</td>
<td>5,139</td>
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<tr>
<td>Gwynedd</td>
<td>7,996</td>
<td>3,880</td>
<td>11,876</td>
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<td>Conwy</td>
<td>9,642</td>
<td>3,823</td>
<td>13,464</td>
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<td>11,032</td>
<td>3,515</td>
<td>14,546</td>
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<tr>
<td>Flintshire</td>
<td>7,722</td>
<td>5,431</td>
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<td>10,778</td>
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<tr>
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<td>4,651</td>
<td>19,482</td>
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<td>7,836</td>
<td>1,766</td>
<td>9,602</td>
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<td>10,766</td>
<td>4,434</td>
<td>15,201</td>
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<td>Carmarthenshire</td>
<td>19,076</td>
<td>8,852</td>
<td>27,928</td>
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<td>Swansea</td>
<td>17,492</td>
<td>9,258</td>
<td>26,750</td>
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<td>Neath Port Talbot</td>
<td>13,254</td>
<td>7,659</td>
<td>20,913</td>
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<td>Bridgend</td>
<td>12,109</td>
<td>5,657</td>
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<td>The Vale of Glamorgan</td>
<td>13,063</td>
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<td>17,222</td>
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<td>Rhondda Cynon Taf</td>
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<td>7,183</td>
<td>20,775</td>
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<td>865</td>
<td>1,570</td>
<td>2,435</td>
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<td>Caerphilly</td>
<td>9,794</td>
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<td>5,598</td>
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<td>Torfaen</td>
<td>3,585</td>
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<td>34,284</td>
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<td>44,482</td>
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Household Projections for Wales

Local Authority Perspective

Gerry Lynch
Cardiff Council
RELATIONSHIP BETWEEN HOUSEHOLDS & DWELLINGS: WALES LAs

2001 Census Definitions:

- **A household** is:
  - one person living alone, or
  - a group of people (not necessarily related) living at the same address with common housekeeping - sharing either a living room or sitting room, or at least one meal a day

- **Dwellings**
  A dwelling can either consist of
  - one household space (an unshared dwelling) or
  - two or more household spaces (a shared dwelling).

- **A household space** is defined as being in a shared dwelling if
  - it is part of a converted or shared house,
  - not all the rooms (including bathroom and toilet, if any) are behind a door that only the household can use, and
  - there is at least one other such household space at the same address with which it can be combined to form the shared dwelling.

If any of these conditions is not met, the household space forms an unshared dwelling.
How to Convert Household to Dwellings?

- Two main options to convert Households to Dwellings:
  
  - Use a simple ratio method e.g. assume the ratio of dwellings to households at 2007 remains constant to 2026.
  
  - Use a more complex formula e.g. as Chelmer Model does, taking account of sharing rates, sharing factors and vacancy rates.
<table>
<thead>
<tr>
<th>Area</th>
<th>2007 (WAG estimates)</th>
<th>2007 (CLG Data)</th>
<th>2007 (DW/HH)</th>
<th>2026 (WAG 2006B Proj)</th>
<th>2026 (Ratio x HH)</th>
<th>Change 2007 to 2026</th>
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<tr>
<td></td>
<td>Households</td>
<td>Dwellings</td>
<td>Ratio</td>
<td>Households</td>
<td>Dwellings</td>
<td>Households</td>
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<td>1.151</td>
<td>61,230</td>
<td>70,468</td>
<td>9,681</td>
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<td>1.074</td>
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<td>10,842</td>
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<td>42,838</td>
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<td>54,253</td>
<td>11,449</td>
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<td>56,288</td>
<td>0.997</td>
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<td>68,360</td>
<td>12,113</td>
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<td>60,511</td>
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<td>74,335</td>
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<td>Swansea</td>
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<td>78,058</td>
<td>79,741</td>
<td>16,557</td>
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<td>Vale of Glamorgan</td>
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<td>Rhondda CT</td>
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<td>Merthyr Tydfil</td>
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<td>25,957</td>
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<td>86,656</td>
<td>88,559</td>
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<td>35,391</td>
<td>36,419</td>
<td>4,772</td>
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<td>Torfaen</td>
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<td>39,350</td>
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<td>43,275</td>
<td>43,901</td>
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<td>Cardiff</td>
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<td>Wales</td>
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<td>1.041</td>
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% Change in Households 2007-26 (WAG 2006 Based Projections)

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<th>Change (%)</th>
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<td>Neath Port Talbot</td>
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<tr>
<td>Carmarthenshire</td>
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</tr>
<tr>
<td>Powys</td>
<td>10.0</td>
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<tr>
<td>Monmouthshire</td>
<td>10.0</td>
</tr>
<tr>
<td>Denbighshire</td>
<td>10.0</td>
</tr>
<tr>
<td>Newport</td>
<td>10.0</td>
</tr>
<tr>
<td>Swansea</td>
<td>10.0</td>
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<tr>
<td>Vale of Glamorgan</td>
<td>10.0</td>
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<tr>
<td>Neath Port Talbot</td>
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<td>Powys</td>
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<td>10.0</td>
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<td>10.0</td>
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<tr>
<td>Vale of Glamorgan</td>
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</tr>
</tbody>
</table>

For other areas, the % change ranges from 9.0 to 27.9.
Theoretical Dwelling Change 2007-2026
(based on Ratio Method)
Theoretical Dwelling Change p.a 2007-2026
(Based on Ratio Method)
Alternative Calculation (Chelmer)
Households to Dwellings

• Instead of using the ratio of dwellings to households 2007 to estimate the number of dwellings at 2026, an alternative method could be used i.e.

• The basic Chelmer formula could be used provide an alternative calculation (for this example 2001 Census rates are used).
Basic Chelmer Formula
(To Convert Households to Dwellings)

\[ D = H \left[ 1 - \frac{p}{100}(1 - \frac{1}{s}) \right] / \left( 1 - \frac{v}{100} \right) \]

where:

- \( D \) = Total dwellings requirement (not just additional)
- \( H \) = Total households
- \( \frac{p}{100} \) = % of households sharing
- \( s \) = number of households per shared dwelling
- \( \frac{v}{100} \) = vacancy rate
### 2001 Census Data
(for Chelmer Formula)

<table>
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<th>SO48</th>
<th>BG</th>
<th>Bridgend</th>
<th>Caerphilly</th>
<th>Cardiff</th>
<th>Merthyr</th>
<th>Mon</th>
<th>Newport</th>
<th>RCT</th>
<th>Torfaen</th>
<th>Vale</th>
<th>SE Wales</th>
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</thead>
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<tr>
<td>Unocc. Second Homes (0003)</td>
<td>36</td>
<td>124</td>
<td>79</td>
<td>267</td>
<td>50</td>
<td>280</td>
<td>91</td>
<td>159</td>
<td>39</td>
<td>176</td>
<td>1,303</td>
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<td>Unocc. Vacant dwellings (0004)</td>
<td>1,766</td>
<td>1,816</td>
<td>2,600</td>
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<td>1,391</td>
<td>1,322</td>
<td>1,996</td>
<td>4,599</td>
<td>1,117</td>
<td>2,077</td>
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<td>Total Dwellings (0001)</td>
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<td>55,300</td>
<td>72,020</td>
<td>127,476</td>
<td>24,586</td>
<td>36,795</td>
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<td>Merthyr</td>
<td>Mon</td>
<td>Newport</td>
<td>RCT</td>
<td>Torfaen</td>
<td>Vale</td>
<td>SE Wales</td>
<td></td>
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<tr>
<td>Occup. HH spaces in shared dwelling (0122)</td>
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<td>48</td>
<td>12</td>
<td>249</td>
<td>24</td>
<td>60</td>
<td>84</td>
<td>137</td>
<td>8</td>
<td>36</td>
<td>660</td>
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<td>All Occup. HH spaces (0001)</td>
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<td>53,342</td>
<td>69,341</td>
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<td>35,193</td>
<td>56,535</td>
<td>94,553</td>
<td>37,576</td>
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<td>Occup. HH spaces in unshared dwelling (0012)</td>
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<td>69,329</td>
<td>123,331</td>
<td>23,121</td>
<td>35,133</td>
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<td>94,416</td>
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<td>Newport</td>
<td>RCT</td>
<td>Torfaen</td>
<td>Vale</td>
<td>SE Wales</td>
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<tr>
<td>All occ hh spaces in unshared dwelling (0001)</td>
<td>29,584</td>
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<td>56,479</td>
<td>94,443</td>
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</table>

*Image of the 2001 Census Data for Chelmer Formula*
## Chelmer Formula Calculation

**Based on WAG 2006 Based Household Proj.**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Topic/Factor</th>
<th>Note/Source</th>
<th>BG</th>
<th>Bridgend</th>
<th>Caerphilly</th>
<th>Cardiff</th>
<th>Merthyr</th>
<th>Mon</th>
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<th>Torfaen</th>
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<tbody>
<tr>
<td>1</td>
<td>Households at 2007</td>
<td>WAG Household Estimates</td>
<td>30,619</td>
<td>57,707</td>
<td>73,240</td>
<td>132,633</td>
<td>23,815</td>
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<tr>
<td>2</td>
<td>Dwellings at 2007</td>
<td>Calculated using basic Chelmer formula &amp; 2001 census data</td>
<td>32,482</td>
<td>59,769</td>
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<td>3</td>
<td>Households at 2026</td>
<td>WAG 2006 based proj</td>
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</table>

- **P** Sharing Rate (% of households sharing accomm)
  - 2001 Census: (SO490122/SO490001*100) 0.01 0.09 0.02 0.20 0.10 0.17 0.15 0.14 0.02 0.07 0.12

- **S** Sharing Factor (Households per shared dwelling)
  - 2001 Census: (SO490122/(SO49a0001-SO490001-5)) 2.96 2.96 2.96 2.96 2.96 2.96 2.96 2.96 2.96 2.96 2.96

- **V** Vacancy Rate
  - 2001 Census: (SO48) ((0003+0004)/0001)*100 5.74 3.51 3.72 3.66 5.66 4.35 3.76 4.79 2.98 4.42 3.64

- **D** 2026 Implied Dwelling Requirement
  - Basic Chelmer formula applied namely: \( D = \frac{H}{(1-p/100(1-1/s)) / (1-v/100)} \)
  - 37,545 74,136 89,994 171,841 29,554 49,194 73,967 121,183 44,600 69,153 759,167

- **Additional Dwelling Requirement 2007-2026**
  - 2006 less 2007 5,062 14,367 13,933 35,209 2,274 9,590 12,318 17,975 4,623 14,371 129,722

- **Additional Dwelling Requirement 2007-2026 a.**
  - Requirement divided by 19 years 266 756 733 1,853 120 505 648 946 243 756 6,827

**Note:**
- Because the calculation gives some spurious results (anonymising techniques problem?) for a number of LAs (e.g. Mon 5.45, RCT 5.07, Bridgend 4.0, the regional sharing factor has been used for the 10 LAs
- Does not take account of demolitions (need to replace old stock), change of use losses, residential to residential conversions, or change of use gains expected over the period.
LA Process: New Dwelling Requirement

• Each LA will probably either:
  – Use the WAG household projections to determine new dwelling requirement, or:
  – Use HOUSEGROUP, the Chelmer Model of some other method to determine household and dwelling need. LAs should justify any departure from WAG projections e.g. using alternative assumptions.
Other Factors
New Dwelling Requirement

1. ADJUSTMENTS: FOR CURRENT STOCK

• Add for any demolitions (Source: Council Tax records)
• Add for change of use from residential (Source: Development Monitoring)
• Add/subtract residential (to residential) conversions i.e net result houses to flats & flats to houses (Source: Council Tax records)
Cardiff Res to Res Conversions 1994 to 2009

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<th>No. Before</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
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</tbody>
</table>
Residential (to Res) Conversions
Cardiff 1994-2009: Net Change p.a
Other Factors (Dwelling Requirement)

2. TAKE ACCOUNT OF EXISTING LANDBANK:
   • Completions base date to current year
   • Units under construction current year
   • Units consented but not started
   • Units subject to S106 legal agreement
Other Factors (Dwelling Requirement)

3. Allowances:
   • For future Windfalls (i.e sites 10+ units)
   • For small sites <10 units
   • For Changes of Use Gains
   • Any Flexibility Allowance(s)
Dwelling Requirement

Final Calculation:
New Dwelling Requirement = Basic Requirement  
+ Adjustments for change to existing stock  
+ Flexibility Allowance(s)
Less the Residential Landbank
Less Allowances for windfalls, Small sites and change of use gains etc.
= balance to be allocated in Development Plan.
Household Projections for Wales

Local Authority Perspective

Janine Edwards
Conwy County Borough Council
A local authority perspective

• Why do we use household projections?
• What do we use them for?
• How useful have they been?
• How accurate are they?
• What problems have we found?
Why do we use household projections?

“An unsophisticated forecaster uses statistics as a drunken man uses lamp-posts - for support rather than for illumination”

Andrew Lang
How do we use projections?
Traditionally...

<table>
<thead>
<tr>
<th>Households</th>
<th>New-build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwellings</td>
<td></td>
</tr>
</tbody>
</table>

Change over period

No. households x occupancy rate
How do we use projections?
Now also...

<table>
<thead>
<tr>
<th>Service</th>
<th>Measure</th>
<th>Change 2006-2016</th>
<th>Use?</th>
</tr>
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<tbody>
<tr>
<td>Revenues &amp; benefits</td>
<td>Total households</td>
<td>11,300 22%</td>
<td>Income projections</td>
</tr>
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<td>Environmental services</td>
<td>Type of household</td>
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<td>Waste management &amp; refuse collection modelling</td>
</tr>
<tr>
<td>Social services</td>
<td>Lone pensioner households</td>
<td>400 12%</td>
<td>Home care business plan</td>
</tr>
<tr>
<td>Leisure services</td>
<td>Households with children</td>
<td>5,600 44%</td>
<td>Future service use</td>
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</tbody>
</table>

Source: Requests to Corporate Research Unit, Conwy CBC; WAG household projections
So how useful have they been?

• Very!

• As well as practical application, new understanding of forecasting

• Workshops, technical guidance, easy to use software

• Produce our own ‘what if...’ scenarios
How accurate are they?

• Limited means of cross-checking data

• We’ll tell you after 2011

• Only a projection of past trends & assumptions

• Never a truth. Need to be wary of treating them as such

• More accurate in short term?
What problems have we found?

• Novice users vs. sophisticated data
• Communicating that projections are only one possible future
• No variant projections – no ‘wiggle room’
• Used as targets
• Figures updated more regularly than policy
The biggest problem of all

“Data does have a problem, in that it's only available about the past.”

Clayton Christensen
Household Projections for Wales

Outputs
StatsWales

- Headline Results
  - Total Households
  - Private Household Population
  - Average Household Size
- Households by Type
- Wales (based on NPP)
- By Local Authority
• Based on HOUSEGROUP
• New version, new methodology
• Makes results accessible including variants
• Facilitates local forecasts
• Can run with Excel
• Copies available
Reports

• 2006-based Projections:
  – Summary Report
  – Local Authority Report
  – Guidance Leaflet
• Estimates 1991-2007
  – Summary Report
• Copies available at the back
Household Projections
for Wales

Feedback – 2006-based
Population and Household Projections
Household Projections for Wales

Current / Future Work
Future Work

• Re-assess APS/LFS and Communal Establishment data
• Other variants
• HOUSEGROUP WALES training
• 2008-based household projections once revised population estimates for 2002-2008 have been published
Further information

Household estimates and projections page

www.wales.gov.uk/statistics

Email: stats.housing@wales.gsi.gov.uk

Phone: 029 2082 3295