

**bre**

SAP modelling and technical details  
 - accuracy, consistency and repeatability  
 Gavin Hodgson  
 Housing Futures

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Contents

- Some useful links to get you started
- Overview of targets
- SAP, RDSAP and PHPP
- Achieving your final target and monitoring

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Sources of information



**www.innovateuk.org**

1. Technical and Energy Modelling Guidance Notes
2. SAP Extension for Whole House Worksheet
  - Use of 'SAP extension worksheet' to develop a baseline of CO<sub>2</sub> emissions
3. EST guidance on evaluating energy and carbon performance
  - Physical testing: Short/long term
  - Soft testing: post-occupancy evaluation
4. Specification for monitoring equipment

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- www.bre.co.uk/SAP2005**  
**SAP documents**  
**List of accredited software**  
**SAP Appendix Q listings**




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- www.bre.co.uk/SAP2005**  
**SAP documents**  
**List of accredited software**  
**SAP Appendix Q listings**  
  
**www.passivhaus.org.uk**  
**Guidance on PassivHaus**  
**PHPP**  
**Certification requirements**




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R4F SAP extension worksheet v1.4

- Reporting tool to ensure consistency
- Enables reporting and targeting of CO<sub>2</sub> emissions and primary energy use relating to lights, appliances and cooking (building regulations ignore these).
  - Also rebases the SAP calculations based on an internal temperature of 21°C throughout the dwelling – is this right? Monitoring...
- Further guidance is probably required on how to complete the tool, as some ambiguity could still occur in it's completion.
- Sheet can be unlocked if you wish to view the workings.




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## Technical and Energy Modelling Guidance Notes v1.0

### CO<sub>2</sub> and energy targets used in R4F

Not a requirement, due to context of building stock

- **CO<sub>2</sub> target: 17 kg/m<sup>2</sup>.yr [20 kg/m<sup>2</sup>.yr for PHPP]**
  - *Absolute target, based on default assumptions*
  - *All end uses, incl. appliances, cooking etc...*
- **Primary energy target: 115 kWh/m<sup>2</sup>.yr**

Both of the above targets are not 'measures of efficiency' as benefit is given for renewable systems installed.

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## Full SAP or RDSAP

- Full SAP is needed to increase precision and give benefit for improvement measures being considered
  - RDSAP can be used as a starting point however.
  - Full SAP means that the EPC will also be representative of the effort expended.
- Only SAP2005 can be used, despite the benefits of adopting the new SAP 2009.



SAP2009 cannot be used because

1. Methodology has changed considerably (changes to internal gains, hot water assumptions, monthly method, fuel prices, emission factors etc...) – repeatability of results reported.
2. The SAP Extension spreadsheet is based around SAP2005

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## What SAP software?

- Download a list of available accredited SAP software from [www.bre.co.uk/SAP2005](http://www.bre.co.uk/SAP2005)
  - No need to become accredited if you don't wish to issue EPC's
  - Training is recommended in any case, for consistent repeatable SAP calculations

Working practice

- save off separate SAP files/worksheets
  - Base case prior to improvements
  - Improvement scenario, good practice to record cost of saved CO<sub>2</sub> for each improvement package (£/tonne)

Figures for both of the above are required to complete the SAP extender worksheet.



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## Why use SAP2005 v9.81 onwards

- SAP Appendix Q
  - We can model innovative technologies
    - Flue Heat Recovery
    - Waste heat from water
    - Heat pumps (soon...)
    - MVHR/MEV
  - IMPORTANT: EST Monitoring Requirement 4**
    - build projects to undertake testing of mechanical ventilation systems
    - Installation criteria must be achieved.
- SAP Appendix M
  - Guidance on modelling renewable energy technologies



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## Post-completion SAP rating and monitoring

- Ensuring that SAP rating is achieved
  - Brief site manager and do regular visual inspections
    - Airtightness – will be reflected in EPC
    - MVHR commissioning and checklist
    - Material substitutions and changes in spec
- Short term monitoring
  - Pressure test
  - Thermography
  - Co-heating
- Going beyond SAP
  - Design compliance doesn't guarantee real world performance – consider this at design phase



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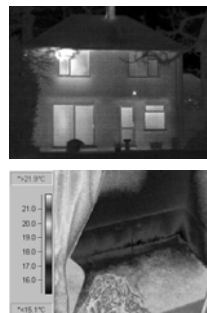
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## Thermal bridging

- Inherent to existing housing stock
- No generic psi-values available for existing stock
  - EST Monitoring requirement 5: Thermal imaging tests carried out before and after the retrofit works
- To be undertaken to BR497 - Conventions for calculating linear thermal transmittance and temperature factors
  - Also don't forget consistency with U-value calculations (BR443)
  - Try to eliminate non-repeating bridges



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BRE – here to help

- Modelling of innovative technologies (SAP Q)
- Strategic guidance – defining targets/construction details
- It not just about operational energy (Code for Sustainable Refurbishment)

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