AccuRate Input Streamlining

- Final Report -

Prepared by

The Association of Building Sustainability Assessors

For the Department of the Environment, Water, Heritage and the Arts

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Executive Summary

The Association of Building Sustainability Assessors (ABSA) has been engaged by the Department of the Environment, Water, Heritage and the Arts (DEWHA) to undertake the AccuRate Input Streamlining project. This project was managed by Glenn Murdoch and involved input from an expert panel (see page 5) and other experienced users of AccuRate in Australia and New Zealand.

The consulting team have identified 74 separate recommendations to improve the speed of using AccuRate software without sacrificing, and indeed improving, the accuracy of the software.

Many of the recommendations will also reduce the chance of errors in data entry.

The recommendations can be broadly separated into four categories:

- user input – the way that users enter data and the way that it is displayed;
- processes – improvements on the processes that AccuRate uses to input and process data;
- reporting – improved reporting giving further useful information to users;
- calculation engine upgrades – improvements to the CHENATH calculation engine to improve the accuracy and relevancy of the results.

For reporting purposes the recommendations are categorised into four levels of priority; essential, high, medium and low.

A graphical matrix has then been used to prioritise the recommendations using expected benefit versus perceived difficulty of implementation.

One of the key recommendations is the creation of a Technical Advisory Group (recommendation 9) to advise on the technical issues relating to the continuing development of the AccuRate software and CHENATH calculation engine, and the implementation of upgrades to the National House Energy Rating Scheme and Green Loan Scheme.

Recommendation 9 also details ongoing input, from the Technical Advisory Group, into the implementation of the recommendation in this report. It is essential that these recommendations are implemented with input from technical modelling experts and experienced users.

Several recommendations made are outside the scope of the project brief. There was a strong consensus however, that each of these recommendations is important to ensuring that thermal modelling software in Australia continues to develop and improve.

Background and Methodology

This report has been prepared in response to the brief for the AccuRate Input Streamlining Project, aimed at identifying ways to improve the speed of using the AccuRate thermal modelling software interface, without sacrificing any accuracy.

The Australian Government plans to implement a Green Loans Scheme in 2009. It is anticipated that this Scheme will conduct sustainability assessments of 270,000 existing homes in Australia over five years. In order to deliver efficient assessments it has identified that software is required that is able to deliver results within the expected time constraints.

ABSA has undertaken the following process to develop recommendations for this project:

- collated feedback from the New Zealand ABSA website forum;
- examined the feedback from the initial AccuRate Pilot conducted in Australia;
- identified high volume users of, and technical experts in, the existing AccuRate software tool in Australia and New Zealand;
- sought recommendations by way of a questionnaire (see Appendix A) from this group of users and experts;
- collated the results of an expert panel which met for a day-long workshop to examine all of the recommendations made, expanded on the recommendations and developed new proposed solutions.

All of the feedback from these sources has been collated into the following recommendations.

Based on feedback from ABSA Project Managers the report has been structured to address essential improvements, and also detail other desirable improvements.

The expert panel comprised the following people:

- Glenn Murdoch (ABSA Assessor, ABSA contractor, New Zealand);
- Graham Hunt (ABSA Assessor, New South Wales);
- Holger Willrath (BERS Pro software developer, Queensland);
- Evan Logan (ABSA Assessor, Western Australia);
- David Howard (ABSA President);
- Kevin Douglass (Former LGSA committee member, ABSA Assessor, New South Wales);
- John Ballinger (Energy Rating Software Support - AccuRate support provider);
- Steve Baker (ABSA Assessor, New Zealand);
- Taryn Cox (ABSA Assessor, Western Australia).

Top Ten Essential Improvements

1. Implement an Undo function

Description

Implement an Undo function that allows the user to undo the last action(s) performed.

Rationale

It is easy in AccuRate to make errors that require a lot of time to fix, and there is currently no method of undoing the last action(s) to correct errors.

2. Implement a mirror dwelling function

Description

Implement a function to 'mirror' a dwelling.

Rationale

This makes apartments and identical houses that are mirror copies much faster to enter.

3. Automatically enter zone volumes, floor and ceiling areas

Description

Implement a process whereby zone volumes are automatically calculated. When entering zone information, the floor area is entered rather than the volume; AccuRate calculates the volume by using the average height of the surrounding walls. The calculated volume is displayed in a greyed-out text box.

When entering floor and ceiling elements, the area is automatically entered from the zone information, but can be amended as necessary.

Rationale

This recommendation in conjunction with recommendation 4 will significantly speed up data entry. This will also reduce errors in zone volume and floor / ceiling area calculations.

4. Implement a roof calculator system

Description

Implement a system to select simple roof types (e.g. hip, gable) and the pitch. From this information the roofspace zone volume and roof elements are automatically calculated and entered.

Rationale

This will significantly reduce the time involved in calculating roof volumes and areas, and will remove the errors introduced by using the 1.19 x floor area method of entering roof surfaces.

5. Create a software manual

Description

Create a good quality software manual detailing how to use the software to model simple and complex buildings, with a continual updating and distribution process.

Rationale

The context-sensitive help has limited use as a reference on how to use AccuRate, and in particular how to model more complicated aspects of a house.

This manual should also include information on the assumptions made, the algorithms used and a list of error messages and their meanings.

A software manual should also have the ability to be regularly updated with procedural methods of modelling difficult situations. This will make it easier for ratings to be conducted in a consistent way across the country.

6. Develop template files

Description

Develop a comprehensive set of template files for project home builder's designs and standard Australian homes, with the following data (as applicable) already entered:

- Zones;
- Constructions;
- Shading schemes;
- Window schedule (see recommendation 28);
- Ventilation;
- Infiltration.

The template files, when opened, create a new, unnamed file with this data entered.

Rationale

There are generally few different types of house in Australia. A comprehensive set of template files will reduce the time in entering data, and will also reduce the chance of modelling similar houses in different ways, increasing the consistency of assessments.

7. Integrate AccuRate and Certificate Manager

Description

Implement a process whereby information that is entered into AccuRate is automatically entered into the ABSA Certificate Manager.

Rationale

The current process of generating Rating Certificates requires a great deal of double entry. This is both time-consuming and increases the chances of errors.

A system to automatically populate the data in Certificate Manager from the data in AccuRate will resolve this. This may mean that the current 'Description' field for entering a description of a Design Option is changed to several 'Recommendations' fields.

8. Enter external screens around the building as a single scheme

Description

Implement a system for entering shading from external screens around the building (such as neighbouring houses, fences, hills and trees) as a system of shading screen elements around the building. This can be implemented in conjunction with recommendation 37.

There are several options for implementing this, listed in order of preference:

- the shading screens are entered on the horizon line with their azimuth, distance, width, orientation and height defined;
- each screen is entered individually, independent of external walls, and the building is then placed within this 'envelope';
- have a shading option such as 'urban', 'suburban' or 'rural' which the software applies to each wall;
- each external wall can have a 'single storey house' or 'double storey house' applied to it, at a specified distance.

Rationale

Entering external screens that surround the building to each external wall is extremely time-consuming, especially in the context of modelling existing homes where the shading from these external screens is often significant.

Entering these screens as an 'envelope' around the building also allows the building to be rotated within the 'envelope' to change the orientation of the building.

9. Create a Technical Advisory Group

Description

Create a Technical Advisory Group (TAG) to advise DEWHA on technical ramifications of policy decisions, and to advise on upgrades to AccuRate software and CHENATH engine upgrades.

Rationale

Currently decisions regarding AccuRate and NatHERS appear to be made with little consideration of the technical impacts of these decisions, which are impacting on the accuracy of the software and scheme.

This current project has assembled an ideal group of technical experts to provide ongoing advice to DEWHA which can continue to be used to advise on technical matters. This group can also advise on the development of the Green Loan Scheme from a technical perspective.

We strongly recommend that some people from this expert panel be consulted on implementing and testing the upgrades recommended within this report.

10. Implement preference settings

Description

Implement a preference settings option that allows the following information to be entered or selected:

- default file save location;
- warning messages can be turned off;
- default eave offset and projection;
- default window head height (also see recommendation 27);
- default window type (also see recommendation 27);
- default wall height;
- weather stripping (see recommendation 60);
- insect screens (see recommendation 60);
- Report save default location (see recommendation 43).

Rationale

While each of these items will save only a small amount of time, when combined they represent a significant time saving.

High Benefit Improvements

11. Beta test new versions of AccuRate

Description

Implement a system whereby new releases of AccuRate are pre-released to selected users for comprehensive testing before general release.

Rationale

Currently the lack of beta testing has led to bugs in the software only becoming discovered after general release, resulting in dissatisfaction and frustration from users.

12. Display the entire construction name in drop-down boxes in the Elements tab

Description

Amend the drop down boxes in the Elements editing section so that the entire construction description is shown.

Rationale

Currently the drop-down boxes only display the first characters of a construction description, making it difficult at times to ensure the correct construction is selected.

This requires a vertically expanding text box with a word-wrap function so that the entire description is displayed.

13. Replace existing data when typing in a field

Description

Implement that entering data in a text field will automatically replace the existing text in the field.

Rationale

Currently, in many fields (especially numeric fields), typing new data does not replace the existing data, and it is easy to introduce errors.

14. Save client, council and project details

Description

Implement the saving of Client, Project and Council details, in the same way that Assessor details are saved. Make these available to new projects.

Rationale

This will save the re-entering of a lot of data.

15. Save post code and climate zone in file

Description

Save the post code and climate zone with the project file wherever a post code covers more than one climate zone.

Rationale

Currently if a project file has a post code that contains two climate zones (e.g. post code 2015, in NSW, for the suburb of Alexandria contains climate zones 17 and 56) the post code and climate zone must be re-entered every time the file is opened.

16. Automatically select post codes and climate zone

Description

Implement a process for automatically entering the post code and climate zone when the site address is entered.

Rationale

This saves time, and reduces the chance of entering the wrong climate zone.

17. Expand and update material library

Description

Update the material library to include more materials, and also implement an upgrade system so that new material libraries can easily be made available to users.

Rationale

The building industry is continually developing new materials and products that are widely used and cannot be modelled with any accuracy in AccuRate. A system that allows the material library to constantly be updated and implemented by users will address this.

18. Make the scroll occur wherever the cursor is positioned

Description

Modify the scroll wheel function so that the window over which the mouse cursor is positioned scrolls when the mouse scroll wheel is used.

Rationale

Currently the mouse scroll wheel scrolls through whichever field is highlighted. The scroll wheel should scroll down the page that the cursor is positioned over, regardless of which field is highlighted.

19. Ensure that AccuRate works on any version of Windows and on Mac OSX

Description

Make upgrades to AccuRate so that it operates equally well on any Windows or Mac OSX operating system.

Rationale

Running AccuRate on some versions of Windows, especially Vista, is problematic. Users who have Vista are experiencing problems installing AccuRate and using the help files.

Many users, especially architects and designers, use Macs. Compiling the software to run on a Mac will allow these users much easier access to the software.

20. Modify the screen layout design

Description

Modify the screen layout design to use the available screen area more effectively, increasing the amount of information that is displayed. Specific requirements are to display more elements, especially external walls.

Rationale

There is a lot of wasted space on the screen,and often not enough data displayed. This can easily be redesigned to maximise the use of the screen area. This must be developed in consultation with end-users.

21. Locate the Apply and Cancel buttons in the same place on each screen

Description

Locate the Apply and Cancel buttons in the same place on every screen.

Rationale

Users currently have to continually use their mouse to move to the Apply or Cancel button, slowing down the use of AccuRate.

This should be considered as part of the screen layout design upgrade (recommendation 20).

22. Activate the Apply button with the Enter key

Description

Activate the Apply button whenever the Enter key is pressed while entering data.

Rationale

The speed of using AccuRate can be greatly increased by making it easier to use the keyboard only, without having to constantly use the mouse to use the software.

This recommendation, in conjunction with recommendations 23, 24 and 25, can make the software virtually mouse free and much quicker to use.

23. Change the tab order

Description

Change the tab order so that the Tab key navigates through the data fields in a logical sequence.

Rationale

Currently the tab order navigates in a confusing and illogical sequence in many of the pages. This recommendation will assist as detailed in recommendation 22.

24. Allow data modification in the tables

Description

Allow data modification in the tables as well as in the detail.

Rationale

This, if implemented in conjunction with recommendation 22, will allow faster editing of data.

25. Increase the available shortcut keys

Description

Make more shortcut keys available:

Ctrl S	Save;
Ctrl O	Open;
Ctrl X	Cut;
Ctrl C	Copy;
Ctrl V	Paste;
Ctrl N	New item in whatever tab / page is current;
Ctrl H	Help;
Ctrl Z	Undo;
Ctrl ⇨	Move to next page in Constructions or Elements;
Ctrl ⇦	Move to previous page in Constructions or Elements;
Ctrl P	Move between Databook and Data Check screens;
Ctrl D	Check Data;
Ctrl R	Run simulation;
Alt P	Project Tab;
Alt C	Construction Tab;
Alt Z	Zoning Tab;
Alt S	Shading Tab;
Alt E	Elements Tab;
Alt V	Ventilation Tab.

Rationale

As detailed in recommendation 22.

26. Make the cursor go immediately to the first data entry field

Description

Implement that the cursor goes automatically to the first data entry field when a new zone, shading scheme or element is added.

Rationale

Currently the software is very mouse intensive, often with several mouse clicks required to begin entering data. The best example of this is adding a new window, when three mouse clicks are required before data can be entered.

27. Implement a window schedule system

Description

Implement a Window Schedule tab where each different window can be entered, and then applied to a wall in a similar manner to Shading Schemes. In this way, a user need only enter the window type and horizontal offset.

This schedule can be saved in an external file by a user for use in subsequent projects.

Another option for the implementation of this is to be able to save a window to the external schedule file once it has been entered, making it available to future projects.

Rationale

Most homes have only a few different windows, especially project homes. Usually, for design stage projects, a window schedule is supplied as a part of the project documentation, making it quicker and easier to enter all of these windows in one schedule.

28. Create elemental heat loss report

Description

Create a report that shows the proportion of heat loss and gain through different element types. This reporting must be available in several levels of detail:

- Proportion of heat loss and gain through floors, walls, windows, ceilings, roofs and infiltration;
- Proportion through walls, windows and roofs of different orientations;
- Proportion through individual elements.

Rationale

This allows easy identification of where a design is failing and makes information available to clients for education and information.

An example is shown below of the graphical display of the top level of display of this information provided by ALF v3.1.1 (thermal modelling software created by Building Research Association of NZ (BRANZ)).

29. Report external wall areas as nett, gross and glazing percentage

Description

In the Constructions tab, display gross (including windows, doors and openings) and nett(without windows, doors and openings) areas of external walls, and (in conjunction with recommendation 30) the glazing area to floor area proportion as required by the BCA.

Rationale

Currently only gross areas are shown. The ABSA Certificate Manager requires a nett area to be entered. This will allow this information to be easily entered, and will also allow glazing percentages to be easily identified for BCA requirements.

30. Calculate floor areas correctly

Description

Calculate the reference floor area correctly. The area underneath walls can be added by multiplying the wall lengths by the width, and adding it to the floor areas.

Rationale

In larger and more complex homes, the conditioned floor area can be significantly less than the actual floor area, increasing the margin of error.

31. Provide guidance notes on window opening percentages

Description

Provide guidance notes on entering the correct window opening percentages. This must be a graphical guide, accessed easily from the window editing window.

Rationale

Window opening percentages are often being entered incorrectly, making the ventilation calculations less accurate.

32. Implement copying changes to all design options

Description

Implement a process whereby changes made to a Design Option can be copied to all other Design Options.

Rationale

If errors are made in the Base Design and identified after several Design Options have been created, it is time-consuming to add this change to all of the Design Options.

33. Create a customisable report

Description

Create a report that users can customise to select the information they want reported.

Rationale

Currently the two reports available, 'Summary Report' and 'Building Data Report' often offer either too little or too much information. This report will need to be developed in consultation with the Technical Advisory Group (see recommendation 9).

34. Divide construction types into Floors, Ceilings and Floors / Ceilings

Description

Divide the Floors / Ceilings construction type into Floors, Floors / Ceilings and Ceilings.

Floors are applied above ground or subfloor spaces, Floors / Ceilings are applied to inter-storey floors / ceilings and Ceilings are applied below roofspaces.

Rationale

Currently, the limit of ten Floor / Ceiling construction types can be a significant restriction when modelling houses with several different floor coverings which need to be applied over ground and other zones. This recommendation will address this problem.

35. Create a tree library

Description

Create a library of common tree types that includes shading percentages for the year[1]. Users need only enter the height and width of the tree.

Rationale

It is very difficult for users to know how to specify shading percentages throughout the year for trees. For the modelling of existing homes where trees will be common, this will both save time and help ensure consistency of ratings.

36. Create a pergola library or calculator

Description

Create a library or calculator for common rafter sizes, spacing and pitch for entering shading from pergolas.

Rationale

Currently the shading from pergolas is being entered in an estimated fashion, leading to inaccuracies.

37. Allow ground reflectance to be entered for each cardinal point

Description

Allow the ground reflectance value to be entered for the eight major cardinal points(N, NE, E, SE, S, SW, W, NW) with a text description for the reflectance value (e.g. water, snow, grass, concrete, bitumen).

Rationale

The current global definition of reflectance value does not reflect reality or a realistic approach to modelling reflected solar radiation, especially when modelling existing homes.

1 The Geometry of the Shading of Buildings by Various Tree Shapes. Sattler, Sharples & Page, Dept of Building Science, University of Sheffield, 1987.

38. Apply a Floor / Ceiling element to several zones below / above it

Description

Implement a simple method of relating zones to those above and below them for easy application of floors / ceilings that are shared across several vertically neighbouring zones.

Rationale

Currently, floors must be manually calculated and entered separately. This is time-consuming, and also impacts on the resulting conditioned floor area calculation (see recommendation 30).

39. Implement an error checking mechanism

Description

Implement another error-checking mechanism, where the element areas around a zone are checked against the volume of the zone to highlight data entry errors.

Rationale

It easy to make simple data entry errors, such as entering 40 instead of 4.0 as a wall length. The current error checking mechanism will not find this error.

An algorithm that checks the total area of elements surrounding a zone in relation to the volume of the zone will help reduce these errors.

40. Include more information in the output files

Description

Include several extra pieces of information in the 'output.txt' and temperature run files that the calculation engine creates, to allow better information to be analysed and reported. This information needs to be presented in a way that makes it easy to graph the information using the existing temperature graphing software tools. The required information is:

- times when windows are opened and closed in each zone;
- times when ceiling fans are operating in each zone;
- times when curtains are opened and closed in each zone;
- the maximum and minimum temperature setpoints for each zone.

Rationale

Currently, any temperature graphs show variations on temperatures that are difficult to rationalise. These variations are most likely related to the operation of window openings, ceiling fans and curtains. Showing these times on graphs allows users to rationalise these seemingly random fluctuations in temperature.

Medium Benefit Improvements

41. Move external walls 'Openings' to a tab

Description

Move the fields for entering Openings in external walls to a tab beside Windows and Doors.

Rationale

The current location of these fields is illogical and can lead to the double entry of a window as a window and as an opening, greatly affecting assessment results. See recommendation 65.

42. Show recent files list in pull-down menu

Description

Make a 'Recent Files' list available in the 'File' pull-down menu.

Rationale

Many users do not save all of their files to a single directory, meaning they have to constantly search for files to open.

43. Allow reports to be saved to last save location

Description

Show the location of the last saved file when saving a report.

Rationale

Currently when users save a Summary Report the save location defaults to '/Projects'. It is time-consuming to navigate each time to the desired save location. See recommendation 10.

44. Display the check box for insect screens correctly

Description

Display the check box display in the list of windows correctly, to accurately show whether or not a window has insect screens.

Rationale

Currently this check box is always displayed as unchecked, even when a window has an insect screen applied to it.

45. Restrict surface colour entry in rating mode

Description

Restrict the surface colour entry, while operating in rating mode, to the external surfaces of walls, roofs and window frames. All other colours are not editable and are set to the default.

This recommendation must be linked to a procedural requirement for default external colours, which must be the default selection on AccuRate.

Rationale

Currently the available surface colours that can be entered lead to confusion and the potential for errors.

Users should be able to specify all the surface colours while in non-rating mode to allow users to perform detailed analyses of the impact of these.

46. Display the last calculated heating and cooling loads

Description

Display the resulting heating and cooling loads on the Project tab when a Design Option is simulated. This information is shown whenever this Design Option is selected.

Rationale

This will allow much faster comparison between Design Options.

47. Simulate and report all Design Options

Description

Implement an option to simulate all of the Design Options at once, and show a tabular report with the heating and cooling loads for all Design Options.

Rationale

This will allow very quick comparison of the Design Options and makes the information easy to use in other reports.

48. Make the columns sizeable

Description

Allow the column widths in the tables to be 'dragged' to change their width.

Rationale

While users can currently double-click on a column divider to automatically resize the column width to the minimum required, the ability to drag column widths will allow users to display whatever data they want to see.

This recommendation is particularly useful in association with recommendation 49.

49. Implement a sort function in tables

Description

Implement a function to sort tables by different columns, allowing elements to be ranked according to orientation, length, zone, construction type or any other column that is shown.

Rationale

This is useful for modifying details of elements when creating a new Design Option (e.g. upgrading the west facing windows to ones with a lower SHGC).

50. Implement drag and drop

Description

Implement a function to allow dragging and dropping of zones, constructions and elements within the table view.

Rationale

Allows users to sort their zones, constructions and elements as they want.

51. Report heating and cooling loads per zone

Description

Develop a report that shows the heating and cooling loads for each zone.

Rationale

This will allow easier identification of problems within a design, by identifying particular zones that have relatively high heating and / or cooling loads.

52. Report total annual heating and cooling loads

Description

Include the total annual energy loads in megajoules and kilowatt-hours in reports.

Rationale

This makes it easier for users to consider and inform their clients of the actual anticipated energy use of their house.

53. Enter opaque louvres as windows

Description

Change the data input for opaque louvres so that they are entered as windows with a different construction.

Rationale

There is no need to separate opaque louvres from windows when entering data. Grouping them together allows for easier display and faster entry of information.

54. Make copying and pasting elements available when viewing all zones

Description

Implement the copy and paste function for elements that this will work for, when viewing the elements for 'All Zones'.

Rationale

Currently a user must navigate between zones to copy and paste elements which is time-consuming and mouse-intensive. In particular, this recommendation will be useful for copying windows.

55. Develop a report that compares a Design Option to the BCA 'Deemed to Comply' standard

Description

Develop a report that compares the energy loads of the current Design Option to the same building insulated to the BCA 'Deemed to Comply' insulation levels.

Rationale

This report makes users who wish to compare a design to the minimum requirements of the BCA very easy. The report would automatically adjust the R-values of elements to those of the 'Deemed to Comply' method and compare the energy loads to those of the current Design Option.

56. Automatically enter external walls and floor of subfloor zones

Description

Implement a function that, once the external walls and floors of the zones above a subfloor zone have been entered, the walls are automatically copied to the subfloor zone. These walls automatically have any windows and doors deleted and have a default height equal to the maximum ceiling height of the subfloor zone. These heights and the construction type can be amended as necessary.

The function also creates a floor for the subfloor zone which has the appropriate construction, and an area which is the sum of the areas of the floors above the subfloor zone.

Rationale

Entering external walls for subfloor zones is time-consuming. This recommendation reduces this time, and reduces the chances of errors.

57. Make more floor / ceiling constructions available

Description

Allow more floor / ceiling constructions to be entered.

Rationale

Currently, the limit of ten floor / ceiling construction types can be a significant restriction when modelling houses with several different floor coverings which need to be applied over ground and other zones. This problem is also addressed by recommendation 34.

58. Implement a method of entering split external walls

Description

Implement a method of entering external walls that are split horizontally with different constructions (e.g. brick veneer to window sill height, weatherboards above).

Rationale

Currently this can be modelled by entering this wall as two separate walls with each having half the height of the total wall. This affects the heat loss calculation through the floor though, as it increases the perimeter length of the floor.

59. Restrict the window weatherstripping option to Yes / No

Description

Restrict the window weatherstripping option to a simple 'Yes' or 'No' option, and the 'Yes' option applies the 'Medium' value.

Rationale

Currently users have three options for weatherstripping, 'High', 'Medium' or 'Low'. These current options are confusing and may be leading to incorrect values being specified. Restricting this option will standardise the values and reduce the margin of error.

Low Benefit Improvements

60. Input weather stripping and insect screens as a default option for window constructions

Description

Implement specification of weather stripping and insect screen default values in window constructions or default preferences.

Rationale

Currently users must specify weather stripping and the presence of insect screens for each window. This would be easier and faster if the default was specified as part of the window construction, or as part of the default preferences (see recommendation 10).

61. Rename shading method

Description

Display the existing name in the text field when renaming a shading scheme.

Rationale

Often a user wants to modify the name of the shading scheme by only a small amount, such as adding a number to the end of the name.

Other Improvements

62. Realistically calculate peak heating and cooling loads

Description

Realistically calculate and report the peak heating and cooling loads.

Rationale

Currently the engine uses heating and cooling loads to bring the internal temperature within the comfort range within an hour. This results in significantly higher than realistic loads which are not useful for reporting.

The expert panel understands that this problem may have largely been solved by Angelo Delsante before his retirement, but it has not been implemented.

63. Correct attenuation rate for insect screens

Description

Correct the ventilation attenuation rate for windows that have insect screens applied.

Rationale

Currently AccuRate models windows with insect screens as having a ventilation flow rate of 85% of windows without insect screens. Studies show that the flow rate can be reduced by more than 50%.

64. Reconsider thermostat settings and time periods

Description

Reconsider the temperature set-points and time settings to reflect actual usage of homes.

Rationale

The current thermostat settings and time periods do not reflect how people actually condition their houses, especially for cooling. In tropical climates more cooling takes place at night than during the day even though it is hotter during the day than at night. This is due to the priority of getting a good night's sleep and the actual cooling of homes during the night to achieve this.

Currently the temperature set-points are the same for the whole of Australia, which does not reflect the reality of the way homes are being used. Temperature set-points and time settings should reflect this real occupant behaviour.

The current temperature set-points and time settings are leading to high mass designs in tropical climates that produce hotter conditions at night than the lower mass designs that are cooler at night but score fewer stars.

We understand that some of this work may already have been completed. The introduction of this recommendation will make acceptance of any national rating scheme easier in the tropical climate states in Australia.

65. Re-evaluate the use of area adjustment factors

Description

Re-evaluate the use of area adjustment factors and amend accordingly.

Rationale

The use of area adjustment normalising factors does not have any scientific justification. To use a complex modelling algorithm and then adjust the result for different locations is irrational.

The adjustment factor is supposed to be based on the fact that the window to floor area ratio becomes smaller for larger buildings, and performance is dependent to an extent on this ratio.

Research[2] shows that using an Envelope Area Index leads to more accurate ratings.

66. Re-introduce mechanical ventilation for night-time ventilation

Description

Make mechanical ventilation available as a night-time ventilation method. The mechanical ventilation calculations must allow for push and pull systems.

Rationale

The software currently doesn't allow for ventilation systems that are often, in some climates, a commonly used method of ventilating the home.

The software and calculation engine must be able to model realistic scenarios, if these scenarios are likely to produce a more realistic modelling result.

2 A Study of an Energy Consumption Index Normalised for Area in House Energy Rating Schemes, Thomas & Thomas, 2000.

67. Allow modification of thermostat settings and time periods in non-rating mode

Description

Allow users to set their own thermostat settings and time periods, including intermittent conditioning, while using non-rating mode.

Rationale

Often clients desire more accurate information from assessors based on their actual usage of their house. Currently this is not achievable since houses are modelled as being conditioned 24 hours per day.

While this will not necessarily create accurate and representative heating and cooling loads, it is far more accurate than the current thermostat settings and time periods for many situations.

68. Re-survey occupant and appliance heat gains

Description

Re-survey and recalculate the occupant and appliance heat gains according to building type and climate zone.

Rationale

The current values for occupant and appliance heat gains are flawed because of the way internal energy due to occupants and appliances are apportioned:

- a large home has the same kitchen heat gains as a small bedsit apartment;
- the usage of kitchens has changed dramatically since the data for the existing gains was developed;
- homes now have much higher appliance heat gains due to having more appliances;
- the existing data is several decades old and was only recorded in Melbourne.

New Zealand has much more recent data that has been implemented in the NZ Home Energy Rating Scheme, but it is unknown how this data relates to Australia.

69. Develop a process for managing the updating and distribution of CHENATH engine upgrades and NatHERS

Description

Develop, implement and manage a process whereby upgrades to the CHENATH calculation engine and the NatHERS scheme are robustly managed, distributed and communicated.

Rationale

While this recommendation is outside the scope of this project there was a strong consensus amongst the expert panel that without this process, there is a high chance for a range of software and engine versions to be used, potentially resulting in a range of differing rating results.

There is currently no process or responsibility for managing, administering and distributing upgrades to the AccuRate software, CHENATH engine and NatHERS program. There is no good information on which users are using which versions of software and consequently no guarantee that assessments are being conducted across the country using identical modelling parameters.

70. Fix the modelling of permanent openings

Description

Fix the way permanent openings are modelled in the CHENATH engine.

Rationale

Permanent openings in walls are all currently modelled as controlled openings because of problems due to the non-convergence of solutions to the ventilation network calculations.

CSIRO may have solved this problem but the new engine has not been made available so permanent openings still can not be modelled accurately (see recommendation 69).

71. Update wind data in climate files

Description

Update the climate data files to include locally appropriate wind speed and direction data.

Locally appropriate wind data may easily be available from the Bureau of Meteorology recording sites. This local data can be implemented based on the post code selected within AccuRate.

Rationale

The current ventilation model in the CHENATH engine is based on pressure coefficients, wind speed and direction. Because the software currently uses only 69 climate files, most site locations are assigned a climate file constructed using wind data measured at a location that is tens or even hundreds of kilometres away. This makes the wind speed and direction data used inaccurate for many locations.

For example, the Western Brisbane climate data file (CLIMAT11) uses data from the Amberley Air Force Base where there is hardly ever any wind. This is evident from examining the data in the climate file.

This results in very little credit being given to ventilation strategies for Brisbane homes that have enough wind to be able use ventilation for physiological cooling in summer.

Given the difficulty of implementation of this item it has been given a low priority.

72. Use a different metric for rating houses in tropical climate zones

Description

Use a different metric for rating houses in tropical climatic areas, such as Northern Territories, northern New South Wales, Queensland and northern Western Australia, where buildings are often used in free running mode. This will better reflect the actual impact of thermal mass and ventilation.

Rationale

Currently all simulations are based on conditioned buildings. There are many mild climate zones where there is little or no actual heating or cooling used, so this type of modelling is inappropriate.

Research[3] indicates that there is little correlation between energy loads per square metre and actual energy usage.

These climate zones should use a different metric for rating that reflects the way these houses are actually used.

Options for different metrics include:

- MJ / m^2 total external surface area;
- heating and cooling degree hours of discomfort;
- total energy per person per year;
- MJ / m^3.

Using a different metric for different climate zones can still easily provide a robust correlation between star ratings in different areas of the country.

A reliable method of recording actual energy performance may provide more accurate data for the reporting of Kyoto Protocol information.

3 Home Energy Rating Industry Reference Group Progress Report, Jo Keiboom, 4 December 2006

73. Change reference floor area from conditioned floor area to total floor area

Description

Change the reference floor area to include all floor areas, except for roofspaces, subfloors and garages, regardless of whether or not they are conditioned.

Rationale

Currently only conditioned floor areas are included in the reference floor area. This allows users to manipulate the assessment result by making spaces unconditioned by separating them from conditioned spaces with a door, leading to lower energy loads.

The New Zealand version of the software has implemented this strategy as a disincentive for minimising the conditioned floor area by physically separating zones that require conditioning from zones that do not.

74. Make other front end applications available

Description

Assist other existing front end application developers with the development of their application to allow its use for the Green Loan Scheme.

Rationale

While this recommendation is clearly outside the scope of this project, there was a strong consensus among the expert panel and other users from whom input was sought, that using other front end applications, particularly those with a graphical input device, was the quickest and easiest way to make assessments faster.

There were often suggestions for many of the recommendations for AccuRate to have a graphical input device which would make many of the recommendations very easy to implement.

While this is obviously not feasible for AccuRate, there are other applications that fulfil these criteria.

Amongst the existing assessors in Australia, many use the existing graphical input software tools. We are not suggesting that these tools become the only option, only that assistance is given to allow these tools to be developed to meet the requirements of the Green Loan Scheme.

Recommendations

A large range of improvements have been identified, with differing levels of benefit and differing levels of difficulty of implementation.

In summary, it is recommended that:

- **all of the Top Ten Essential Improvements be implemented immediately;**
- **the Technical Advisory Group (recommendation 9) be consulted on prioritising the remainder of the High Benefit Improvements;**
- **all of the High Benefit Improvements be implemented in a staged process over the next year;**
- **the remaining improvements be implemented in the following year.**

The value of the benefit of an improvement was arrived at by consensus from the expert panel. There was an understanding that there was a differing level of difficulty of implementation for each improvement, and this is represented graphically overleaf in a matrix. The horizontal axis of the matrix shows the perceived difficulty of implementing a recommendation, the vertical axis shows the benefit to users of the recommendation.

The numbers in the matrix refer to the recommendation numbers in the previous sections.

The matrix shows, using colour coding, the priority for implementing the recommendations. The recommendations have been prioritised as a combination of benefit and ease of implementation, hence not all of the high benefit improvements are high priority. Some of those that are very difficult to implement have been awarded a lower priority as a result.

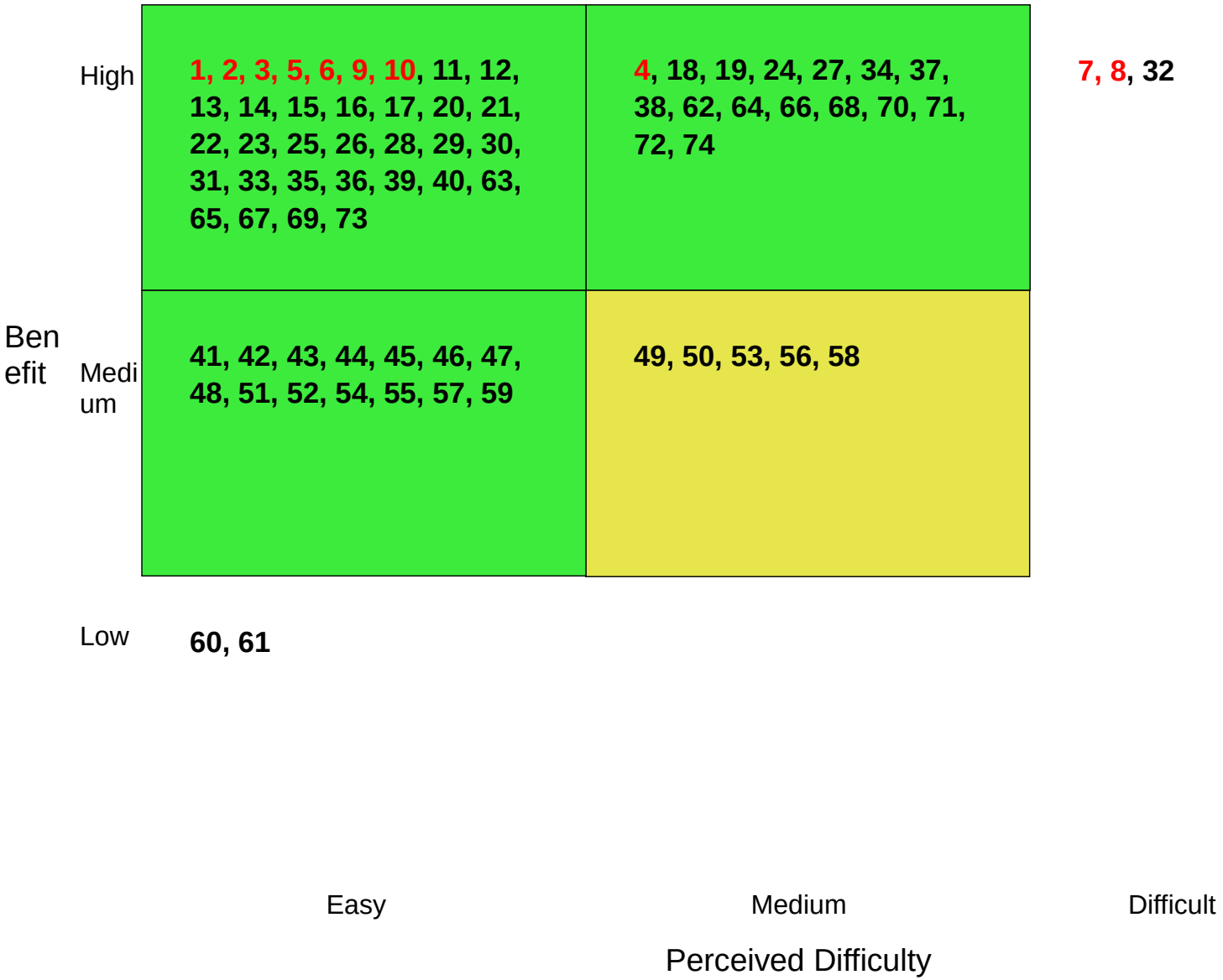
High Priority

Medium Priority

Low Priority

Not Worth Implementing

The Top Ten Essential Improvements are highlighted in **red text**.


High
Medium
Low
Benefit
1, 2, 3, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 25, 26, 28, 29, 30, 31, 33, 35, 36, 39, 40, 63, 65, 67, 69, 73
4, 18, 19, 24, 27, 34, 37, 38, 62, 64, 66, 68, 70, 71, 72, 74
7, 8, 32
41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 54, 55, 57, 59
49, 50, 53, 56, 58
60, 61
Easy
Medium
Difficult
Perceived Difficulty

Appendix A – Questionnaire

The questionnaire on the following pages was sent to high volume AccuRate users throughout Australia and New Zealand for feedback on AccuRate.

20 June 2008

AccuRate Input Streamlining Project

Thanks for agreeing to help with this project. This project is being undertaken by ABSA for DEWHA as part of preparing for the introduction of the Green Home Loan Scheme in April 2009.

The purpose of the project is to develop ideas around ways to improve the speed of using AccuRate, without sacrificing any level of accuracy. A report will be prepared for DEWHA, who will then consult with the developers of AccuRate to determine which of our recommendations can most easily and cost-effectively be implemented.

This is an opportunity to significantly improve AccuRate and make it considerably easier to use.

We have identified three main areas in which we can consider improvements to AccuRate. Please outline your ideas on the following pages on ways to improve the usability of AccuRate, that will make the process of modelling a home faster.

Please return the completed document by email to g.murdoch@absa.net.nz by 4 July 2008.

Thanks for your help.

Regards,

Glenn Murdoch

ABSA NZ

Name:

Phone:

Email:

User Interface

How can the user interface be streamlined to make it more efficient to enter data? How can the way the items are laid out on the screen be improved? How can the way you navigate through the programme be improved?

- *<Start your ideas here>*

Processes

How can the way we provide information to AccuRate be improved? Are there any easier ways to provide information?

- *<Start your ideas here>*

Reporting

What other information and reports would be useful as outputs from AccuRate?

- *<Start your ideas here>*

Other Ideas

What other ways are there to improve the speed of modelling homes using AccuRate, without sacrificing any accuracy?

- *<Start your ideas here>*