

The Irish approval scheme and validation procedure of non-domestic building energy calculation software: procedure document

§1.1 Introduction

Non-domestic building energy calculation software packages to calculate building asset and operational ratings must now be approved by the Sustainable Energy Ireland (SEI) before they could be available for commercial use in the Republic of Ireland. For more information on the validation procedure and the approval scheme is available on a SEI website [www.sei.ie/ber].

This document outlines details of the approval scheme and elaborates on the validation procedure necessary to achieve approval from SEI. This will be relevant to the following non-domestic software classification:

- Front-end Interface for the Simplified Building Energy Model engine (FI-SBEM)
- Dynamic Simulation Modelling (DSM)
- Operational Rating Calculation (ORCalc)

The approval scheme has two outcomes:

1. An approval by SEI that the software in its current state and form has met all compliance requirements and therefore is fit for commercial use
2. An application is deferred as it has not met all compliance requirements. In this case, recommendations will be provided as to how compliance can be achieved

Submission criteria are as follows:

- The applicant software must already been approved for commercial use in England and Wales
- Relevant information requested have been provided (see §1.3)
- Demonstrate that self-assessment has been carried out and a report is included to justify this

Application that satisfies the listed criteria will be accepted and this will marked the start of the validation process. Otherwise SEI will defer the application until outstanding issues are resolved.

§1.2 Definition of software class

Three software classes are being validated and approved in this scheme and the following are their definitions:

Front-end Interface for the Simplified Building Energy Model engine (FI-SBEM)

- Front-end software that interfaces with the iSBEM™ or SBEM™ engine to calculate building emission rate and asset rating (Energy Performance Certificate)

Dynamic Simulation Modelling (DSM)

- This primarily applies to building analysis software that can model the dynamic response of the building to parameters such as external environment, internal gains, and may also include the dynamic interactions of the building services. DSM software must be able to use the environmental conditions set by the CIBSE annual hourly weather tapes. This class of software will also have the capability to calculate building emission rate and asset rating (Energy Performance Certificate)

Operational Rating Calculation (ORCalc)

- Software to calculate the operational rating of a building from annual utility consumption and produce a Display Energy Certificate and/or Advisory Report

§1.3 Required information when submitting an application

When applying to the approval scheme, the software vendor must supply the following:

- vendor company name, mailing address
- vendor representative name and contact detail (email address)
- software package name and version number
- software classification (FI-SBEM, DSM or ORCalc)
- a separate application is required for each software that fits more than one classification, or for each software of the similar class but with different configurations
- confirmation that the software meet test specifications and guidance by undergoing a self-assessment procedure

All the above information should be provided in the pro-forma supplied with the information package and included in the submission package.

§1.4 Self-assessment procedure

Along with the test cases, the vendor will also receive a set of self-assessment procedures. The self-assessment procedure will ensure that the software test case outputs are compliant with a required set of guidelines before a submission is made. For each software class, the relevant document or input reference files will be provided, against which the vendor's software output will be benchmarked.

Self-assessment procedure for FI-SBEM software class

- The reference iSBEM input files (*.nct) will be provided and the vendor should use these files to produce similar output as their software to benchmark against. The vendor must ensure that the format of the SBEM input file (*.inp) produced by their software must match the reference input file (*.inp) exactly. In addition, the output values must also match the benchmarks for the following parameters: Primary energy usage for the actual building, primary energy use for the reference building and primary energy use for the notional building.

Self-assessment procedure for DSM software class

- A document summarising the relevant calculation output for each test cases will be provided. This should cover the annual primary energy consumptions and related emissions, Energy Performance Coefficient, Carbon Performance Coefficient, Building Energy Rating (BER), amongst other parameters.

Self-assessment procedure for ORCalc software class

- The reference input files (*.orc) for each test cases will be provided. The vendor should use the government version of the ORCalc software to load these files and run the calculations to generate the relevant documents (DEC, Advisory Report and technical table). These documents will then be used to benchmark the vendor's own software output.

A report summarising the outcome of the self-assessment must be produced and included in the application submission. The template for this is attached in the pro-forma included in the information package. An application will not be accepted until divergences from reference are resolved unless otherwise clearly justified. This is to ensure smooth progress of the validation process.

§1.5 Application and submission of deliverables

After the software tests are completed, an application to have the software validated and approved is to be filed online via email to an address provided by SEI. The email must contain all the required deliverables listed below:

[a] FI-SBEM class

- Submission pro-forma or checklist
- vendor's FI-SBEM software input files (.inp file, and .nct file if applicable)

- BRIRL summary document (in *.pdf* format)
- Building Energy Rating (BER) Certificate (in *.pdf* format)

[b] DSM class

- Submission pro-forma or checklist
- BRIRL summary document (in *.pdf* format)
- Building Energy Rating (BER) Certificate (in *.pdf* format)
- Documentation of additional results from test models

[c] ORCalc class (not yet active)

- Submission pro-forma or checklist
- vendor's ORCalc software input and output files (in *.xml* format)
- Display Energy Certificate (in *.pdf* format)
- Advisory Report (in *.pdf* format)

§1.6 Validation procedure

Submitted tests will first pass through a high-level sanity check to ascertain compliance of submission to specified guidelines. Passing the check, the application will be processed and the software test output will be validated. The results for the ORCalc and FI-SBEM software tests must be in exact agreement with SEI's reference results. For the DSM software tests, agreement within stringent margins must be achieved with SEI's reference results.

In cases where discrepancies are discovered in the software test output, the vendor will be contacted for consultation regarding outstanding issues. The vendors will be given two attempts, with duration of two weeks for each attempt, to resolve all the raised issues. Thereafter, the submission will be considered below compliance standards and hence will be deferred. A new application will be required for further attempt at obtaining SEI software approval.

§1.7 Recommendation

At the end of the validation process, if all criteria are met and Software Testing House is satisfied with the general outcome, recommendations will be forwarded to SEI to approve the software. The decision by SEI is final and any dispute raised will not be entertained by SEI. SEI will propagate the process by approving the software at its current form and sending out official notice of approval to the software vendor.

If the software does not meet requirements, a recommendation to defer the application will be forwarded to SEI. SEI again holds the final decision and a notice will be sent to the vendor. Where applicable, recommendations will be provided to the vendor as to how to proceed to improve the software to meet specifications and to achieve future compliance. To achieve compliance and approval in future, new application will be required.

§1.8 Re-validation for re-approval

It is accepted that software packages undergo constant changes to incorporate fixes, upgrades and improvements over time. However, this exposes the software to potential unintended modification affecting its calculation. For this reason, software will need to be re-validated and then re-approved.

Conditions/changes that render the approval status void, hence requiring software to be re-validated are:

- major changes to software architecture, calculation engine, platform or software name
- changes initiated by vendor developer affecting calculation
- changes to guidance and specification requiring software packages to comply
- when self-validation fails

For minor changes, a self-validation procedure should be exercised. This requires the vendor to carry out the similar tests carry out in the original validation process on their latest software. The pro-forma should then be used to submit a report to SEI to update of changes to software version number and to confirm that the changes have not affected its approval status. If self-validation fails, the vendor will have to make a full application again.

§1.9 Software validation tests and procedures

§1.9.1 FI-SBEM tests

The vendor will conduct a set of four test cases on the software of which outputs must be in exact agreement with the SEI's reference outputs. Information on these test cases is included in the information package. They are essentially models of buildings where a run for Irish PartL compliance check and the production of Asset Rating and BER will be required as submission. The requirement is that the resulting input files must match the reference input also supplied in the information package, in terms of format and figures.

§1.9.2 DSM tests

As the applicant software must already been approved for commercial use in England and Wales, a reduced version of the test cases has been introduced. Essentially, there are six test cases to assess the ability of the software to emulate the reference and the notional building in the actual building and its compliance with the Irish Part L.

§1.9.3 ORCalc validation procedures (not active yet)

Work has not commenced on the development of the Irish ORCalc software therefore this section is not yet relevant.