

ENVIRONMENTAL PERFORMANCE OF BUILDINGS

Four Objectives

The following objectives were set for IEA work:

To develop quality assurance procedures for calculating the energy and environmental performance of buildings by producing guidance on:

- program and modelling assumptions
- the appropriate use of calculation methods for a range of design applications
- the evaluation of calculation methods

To establish requirements and market needs for calculation procedures in building and environmental services design.

To propose policy and strategic direction for the development of calculation procedures.

To propose means to effect technology transfer of calculation procedures into the building and environmental services design profession.

This three year project involving ten countries and the European Community started in October 1989 after an extensive feasibility study into the state of the international art in building thermal modelling.

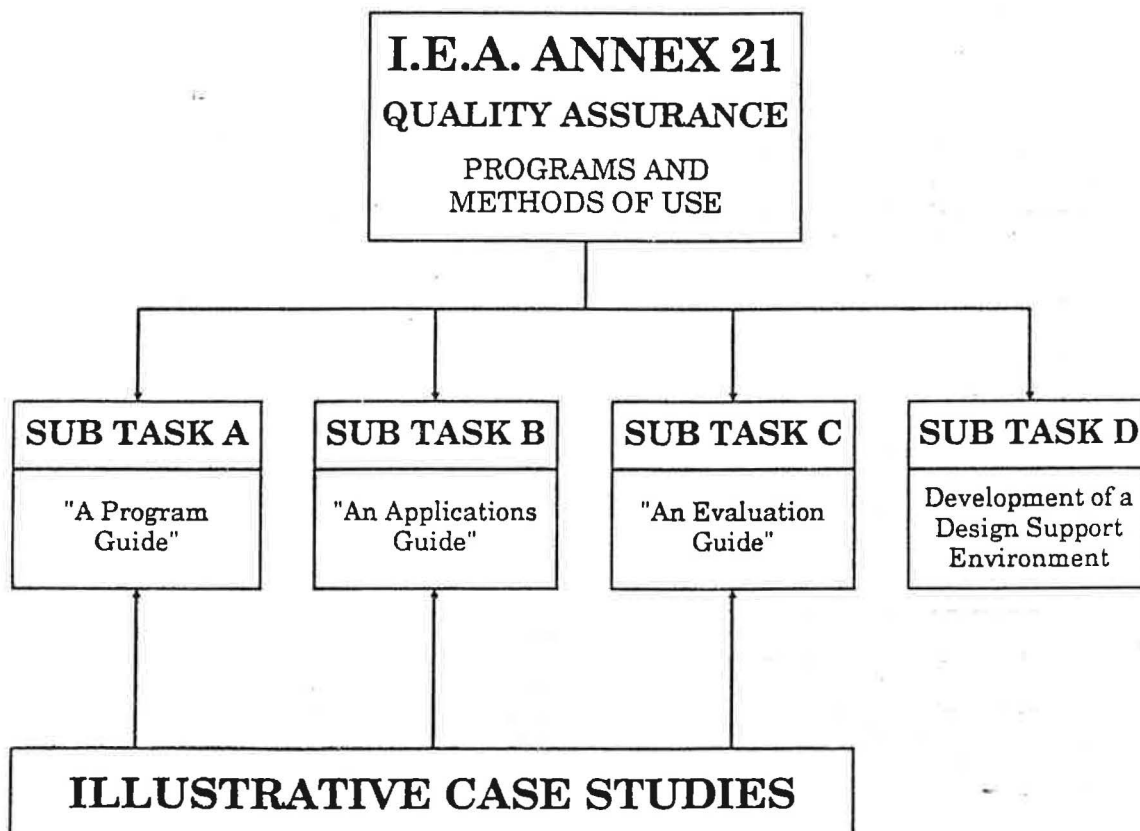
Simple or Complex Models

The feasibility study identified a need for a range of different models varying in complexity, accuracy and capabilities according to the purpose and stage in the design process. The purpose for which the model is being used (or 'application') has a significant influence on what is needed, particularly in:

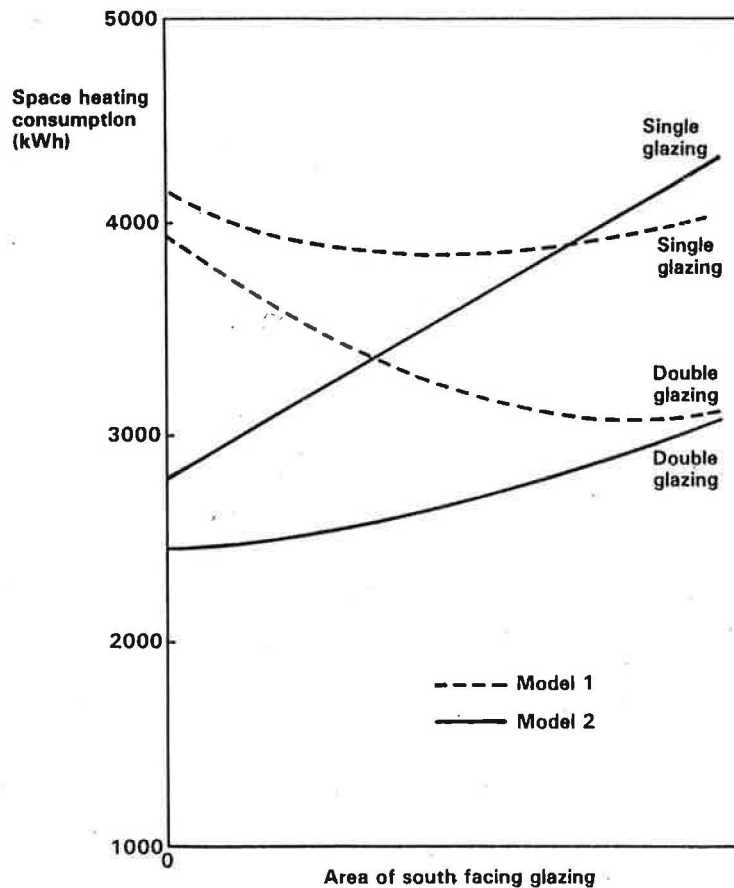
- model capabilities
- user interface
- speed of solution
- data to be used
- appropriate level of representation of building

Existing International Liaison

Other international collaborative work in the modelling field has been considered, not only other IEA initiatives but also the European Community COMBINE and PASSYS programmes, the USA AEDOT initiative as well as output from the standards organisations CEN and ISO.



Effect of area of South-facing glazing on space heating consumption as predicted by 2 widely used models



Six Problems

Difficulties faced by model users are:

- inadequate documentation of current models and their limitations
- lack of independent, objective means of quantifying how good the models are
- inadequate understanding of industry needs and documentation of appropriate procedures for using model
- insufficient attention to human computer interface
- lack of integration between models, eg heating, lighting, CAD, etc.
- lack of firmly based and standardised data on materials properties occupant behaviour

The experts involved in the feasibility study, identified four areas (or subtasks) for further international collaborative effort

- documentation of existing models
- appropriate use of models
- reference cases and evaluation procedures
- design support environment

User friendly

The importance of the program user is recognised throughout, in particular the questions he must have answered.

- ease-of-use, mistakes, misunderstandings
- what methodology is used
- what input data should be used – how selected?
- what output information is required?
- how should building be zoned?
- what accuracy is needed?

Validation

The inevitable difficulties of validating computer programs continue, there is now a realisation that we will never reproduce all aspects of reality for all buildings, climates and operating conditions. The problem is intractable unless approximations or simplifications are made, how 'good' these are will depend on why the program is being used – the application.

We must understand the application before judging program adequacy.