Let's take a very simple building with a 10mx10m footprint 3m high. There are 4 windows of 2m x 1.5m (H) and an entrance door in the south elevation. Constructions are to the 2002 building regulations as depicted below. Heating is a standard radiator system and lighting is via T8 fluorescent luminaries.



The EPC's below show a significant variation in the rating depending on what software is used from B/46 to C/54. More worrying is the comparison against a typical building with a wide variation indicating that the typical UK office stock is achieving a rating of between C/66 and D/84. We would suggest that a typical office building in the UK is performing much worse than this.

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EPC produced using iSBEM at Level 4





EPC produced using IES with an SBEM Calculation Engine at Level 4

EPC produced using IES with ApacheSim Dynamic Simulation Modelling (DSM) at Level 5



Let's say you are a developer and you need certification that will demonstrate your building complies with the 2006 edition of the Building Regulations Part L (which deals with building energy efficiency). You know that you need a 25% improvement over the 2002 edition in order to achieve a pass so you decide to have super insulated constructions and a boiler with 96% efficiency and efficient T5 high frequency lighting.



Part L Compliance Document produced using iSBEM

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Part L Compliance document produced using IES with SBEM Calculation Engine

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Part L Compliance Document produced ApacheSim Dynamic Simulation Modelling (DSM)

This comparison is even more worrying. The IES Level 4 calculations that produced a worse EPC than its iSBEM equivalent when producing an EPC indicates that the building complies with the building regulations with a small margin over the target emissions. The iSBEM target emissions rate is 17.7% lower (remember this is the same building) and this indicates the building is failing by around 10%. The IES level 5 calculation has the most onerous target emissions rate (why we don't know because this is exactly the same building) a whacking 30% lower than its level 4 equivalent and we are failing to meet this by around 10%.

So the message to developers is clear and you need to have your building evaluated by several software packages in order to determine the one that is most beneficial to you.

Let's say you are a concerned environmentalist and your objective for this building is an A+ rating with zero energy/carbon emissions using renewable energy sources (according to the government all buildings will be built this way within the next 7 years so we had better start learning how to do this).

Let's say we are going to use a biomass boiler for the heating, have 20m2 of solar thermal panels to meet the hot water demand and have a wind turbine to meet the electrical demand 10m high with 50kw output (if you can get planning permission!) but this is in a suburban location so not ideal for a wind turbine.



EPC produced using iSBEM at Level 4

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EPC produced using IES with an SBEM Calculation Engine at Level 4

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EPC produced using IES with ApacheSim Dynamic Simulation Modelling (DSM) at Level 5

This would require a substantial investment in renewable energy much more than the minimum required by the building regulations and I know from experience that it would be possible for this arrangement to cater for all the buildings energy needs and have surplus energy that can be exported.

The only software that is capable of properly analysing this degree of renewable energy is the IES Level 5 software which indicates that the building will be A+ rated and net zero carbon emissions (in fact the building will be a significant net energy generator and could be used to export energy potentially)

The questions asked by iSBEM are entirely inadequate to assess the impact of the renewable energy systems under consideration and this predicts that the building will not achieve A+ of zero carbon and has an A/12 rating. The worst analysis comes out of the IES software which despite asking the right questions on things like the solar energy systems gives the most pessimistic prediction with a B/22 rating.

Let's say this isn't a building built to 2002 standards but is typical of the existing stock of poorly insulated building with solid walls, uninsulated roof and floor and single Glazing. 90% of buildings in the UK do not have proper (or any) insulation and this is the type of building that the EPC scheme is intended to address.



EPC produced using iSBEM at Level 4

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EPC produced using IES with ApacheSim Dynamic Simulation Modelling (DSM) at Level 5

This comparison reveals a wide range of results with the Asset Rating varying between D/93 and G/151. So depending what software your energy assessor is using you can receive an EPC that is actually quite good considering this building has no insulation at all and an inefficient heating system or the worst rating in the scale. All these results are obtained with precisely the same inputs using standard National Calculation Methodology (NCM) inputs simply changing the fabric U values so we are comparing like for like. I would suggest that the G/151 rating produced using Dynamic Simulation Modelling (DSM) is the most realistic but if you want the best rating for your building you should employ an assessor with the most basic tools available to produce your EPC. This makes a mockery of the stated intention of this scheme to drive up the efficiency of our existing buildings. It also makes a mockery of the advanced tools that are available to analyse your building which lead to unfavourable results compared to the free (largely unsupported and fundmentally flawed) software produced by the government.

However there is a major catch with going down this route. LED and other responsible energy assessing organisations have been repeatedly raising problems with the government's SBEM software since the scheme was introduced on 1st October 2008. To date we have logged several hundred such issues none of which have been satisfactorily addressed by the governments Communities and Local Government (CLG) department who are ultimately responsible for the EPC scheme or the Building Research Establishment (BRE) who are responsible for producing the software and its associated methodology. Around 80% of these issues have been sponsored and supported by CIBSE but BRE and CLG continue to publicly ignore the feedback from their energy assessors and accreditation bodies although privately they acknowledge there are major flaws with this.

LED understands from senior sources that are close to CLG and BRE that they have considered scrapping the SBEM software that is used to produce energy certificates because of the flaws that exist. LED are involved with a judicial review of this scheme which will be heard in September 2009 so this matter may be taken out of the hands of CLG and BRE.

Where this will leave the several hundred thousand clients that have commissioned EPC's to date is unclear but there is a serious risk that existing EPC certificates produced using SBEM could become worthless.



LED's view is that CLG and BRE have failed to properly implement the Energy Performance Directive in Buildings and are costing the industry Millions of pounds on an exercise that has little merit at a time when the industry is suffering the worst recession in living memory. Whilst we and other professional energy assessing organisations continue to provide EPC certificates in order to assist clients to meet their legal obligations and we produce certification in full compliance with the requirements of the EPC scheme we have serious concerns about the validity of this information due to flaws' with the software which are outside the control of LED.

We believe CLG and BRE are acting in an irresponsible manner that is against the public interest by refusing to recognise the legitimate issues raised by LED and other professional organisations. When the government implements its stated intention of linking EPC's to taxation because of the unreliability of the EPC certificates this will lead to grossly unfair taxation arrangements.

LED call on CLG and BRE to ensure a programme is put in place in a timely fashion to ensure that energy certificates are produced in a robust manner. LED also calls in CLG and BRE to review all EPC's issued to date and put right at their own cost defective certificates.

