FRAMEWORK FOR ENERGY MODELING FOR GREEN MARK INCENTIVE SCHEME – FAQs

Energy Modeling Framework

Q1: What is the definition of 'air-conditioned buildings' under Energy Modeling?

A1: Under the framework for energy modeling for GMIS, air-conditioned buildings are defined as those equipped with centralized chilled water systems. Under **Energy Modeling**, if a development is equipped with other types of air-conditioning systems such as VRV when the more energy-efficient centralized chilled water system is feasible, energy modeling will be required with the centralized chilled water system as part of the reference model.

Q2: Are there alternatives for calculation methods where energy modeling through software application is not applicable?

A2: Yes, for special situations such as natural daylighting where the modeling software is unable to compute the energy harnessed or consumed, sufficient information and documentation for verification of the accuracy of the exceptional calculation method must be submitted.

Q3: Under Energy Modeling, are renewable sources of energy harnessed by buildings taken into account in the computation of energy savings?

A3: Yes, since these renewable sources of energy will go toward reducing the overall energy consumption by the development.

Q4: Under the framework for energy modeling for GMIS, do we have to include the operation of data centres in the energy modeling analysis?

A4: Yes, this is needed for the computation of the overall annual energy consumption. It should be noted that this is excluded in the computation of the Energy Efficiency Index (EEI).

Q5: What is the energy modeling methodology for buildings serviced by district cooling plants?

A5: In such developments, the bulk of energy consumed by the building will be the consumption of chilled water from by district cooling plants. To compute the energy consumption, it is therefore necessary to know the actual efficiency of the district cooling plants. If not available, the energy modeling must demonstrate compliance with the 2 following criteria in accordance to the Green Mark rating:

S/N	Criteria	Gold Plus	Platinum
1	Cooling Load Savings	10%	15%
2	Energy Consumption Savings (excluding the Air-Conditioned Plant);	27%	33%

Q6: In the case of a mixed use development consisting of distinct office and hotel premises served by a common "chiller plant", can the Energy Modeling be sought based on either of the two premises or does it have to be based on both the premises?

A6: As **Energy Modeling** is based on Green Mark certification, both cases are possible depending on the approach adopted by the developer in applying for the Green Mark certification. If the application for Green Mark certification is submitted as one project development, the certification and **Energy Modeling** will be based on the combined weighted score for various types of development. Similarly, if the application is submitted for each development type separately, the **Energy Modeling** will be granted separately for each development type based on the certification of Green Mark certification and its eligibility for **Energy Modeling**.

The energy consumption of the common chiller plant or other common facilities (eg MV fans for the carpark) will be pro-rated according to the GFA of the development served

Q7: What is the responsibility of the Qualified Persons endorsing the submissions for energy modeling?

A7: The Qualified Persons' main responsibility is to certify that the energy modeling for the development has been carried out in accordance with the requirements under the Framework for Energy Modeling under GMIS. Being also the QPs responsible for the design of M&E systems, they are the best party to ensure that the assumptions and inputs used for energy modeling are bona fide. The energy modeling specialist shall be responsible for the correctness of the modeling including the proper usage of the relevant software.

For the site validation submission, the QPs' main responsibility is to certify that the validation has been carried out in accordance with the requirements under the Framework for Energy Modeling under GMIS.

The Facilities Manager of the building who is responsible for the proper running of the facility to achieve the projected energy savings shall be responsible for the accuracy of the data gathered and that it is a correct representation of the performance of the building. If necessary he should get the developer to engage a competent firm (eg. BMS vendor, ESCOs) to calibrate all sensors and meters to ensure that all readings taken are accurate and that they are a correct representation of the performance of the building.

Software For Energy Modeling

Q8: Which software has been tested to ASHRAE Standard 140?

A8: This should be checked with the software vendor. An example is DOE-2 which is developed by Lawrence Berkeley National Laboratory and supported by U.S. Department of Energy.

Q9: What is ASHRAE Standard 140?

A9: This is the testing standard adopted in USA for the evaluation of building energy analysis computer programs that calculate the thermal performance of a building and its M&E systems. The standard can be purchased and downloaded from the ASHRAE website.

Q10: Will BCA accept new energy modeling software?

A10: New energy modeling software is encouraged especially if it is customized to our tropical conditions. It must however be robust and tested in accordance to ASHRAE Standard 140 or other national equivalent standard.