Information Delivery Manual (IDM) for

Building Energy Analysis (BEA)

Date: *30-May-11*

Version: *1.0*

Table of Contents

1 Process Model

Name **OGC – Energy Analysis at Concept Design Phase**

Change Log		
15-May-08	Initial creation, adapted from Energy Analysis IDM originally developed by Jeff Wix for buildingSMART Norway	Richard See
05-Jun-08	Changes for version 0.15	Richard See
27-Aug-08	Changes for version 0.2	Benjamin Welle Richard See
3-Sep-08	Changes for version 0.3	Benjamin Welle Richard See
2-Dec-08	Changes for version 0.9	Benjamin Welle Richard See
18-Jan-09	Changes for version 0.95	Benjamin Welle Richard See
04-Feb-09	Final changes for version 1.0	Benjamin Welle Richard See

1.1 Overview

Energy analysis is concerned with predicting the usage profile and cost of energy consumption within buildings. Conceptual design phase energy modeling is used to provide the design team with first order of magnitude feedback about the impact of various building configurations on annual energy performance. Conceptual phase energy modeling requires the designer to make assumptions for a wide of range of simulation input if information is not yet available. It takes into account as input data:

- building geometry including the layout and configuration of spaces,
- building orientation,
- building construction including the thermal properties of all construction elements including walls, floors, roofs/ceilings, windows, doors, and shading devices,
- building usage including functional use,
- internal loads and schedules for lighting, occupants, and equipment,
- heating, ventilating, and air conditioning (HVAC) system type and operating characteristics,
- space conditioning requirements,
- utility rates,
- weather data,

The output results of energy analysis may include:

- assessment of the space and building energy performance for compliance with regulations and targets,
- overall estimate of the energy use by space and for the building and an overall estimate of the energy cost,
- time based simulation of the energy use of the building and time based estimate of utility costs,
- lifecycle estimate of the energy use and cost for the building,

For the purposes of this process map, conceptual phase energy analysis is considered to include the assessment of heating and cooling demand within a building during peak periods.

Various types of analyses are within the scope of this process map, including:

- setting comfort criteria for spaces including minimum and maximum required indoor air temperatures (summer and winter), minimum fresh air requirements,
- ,
- heat loss/gain calculations using well defined analytical methods,
- energy performance rating system and/or energy code requirement compliance,
- analysis of energy consumption in meeting the building energy demands,
- optimization of energy performance related to equipment or system type and related equipment/system performance characteristics considering lifecycle cost, environmental impact issues, and comfort aspects.

1.1.1 Cyclical Design

The process of developing energy analysis throughout the design stages of a project is considered to be divided into 2 key parts:

1.1.1.1 Conceptual

This is the analysis work undertaken during the programming and concept design stage of the project. It is about providing advice on the potential energy performance of a building and its systems to other design roles. The aim of this analysis is to have an impact on the overall building design, determine the feasibility of concepts in an energy context and to establish energy targets. Conceptual analysis may be undertaken in the absence of detailed geometric information about the building layout, though frequently general spatial layout is included during this stage. The designer is more concerned with relative performance values between the design options being considered, rather than absolute performance values. Though assumptions typically must be made at this stage, maintaining consistent assumptions between the options being evaluated allows for relative performance to be evaluated.

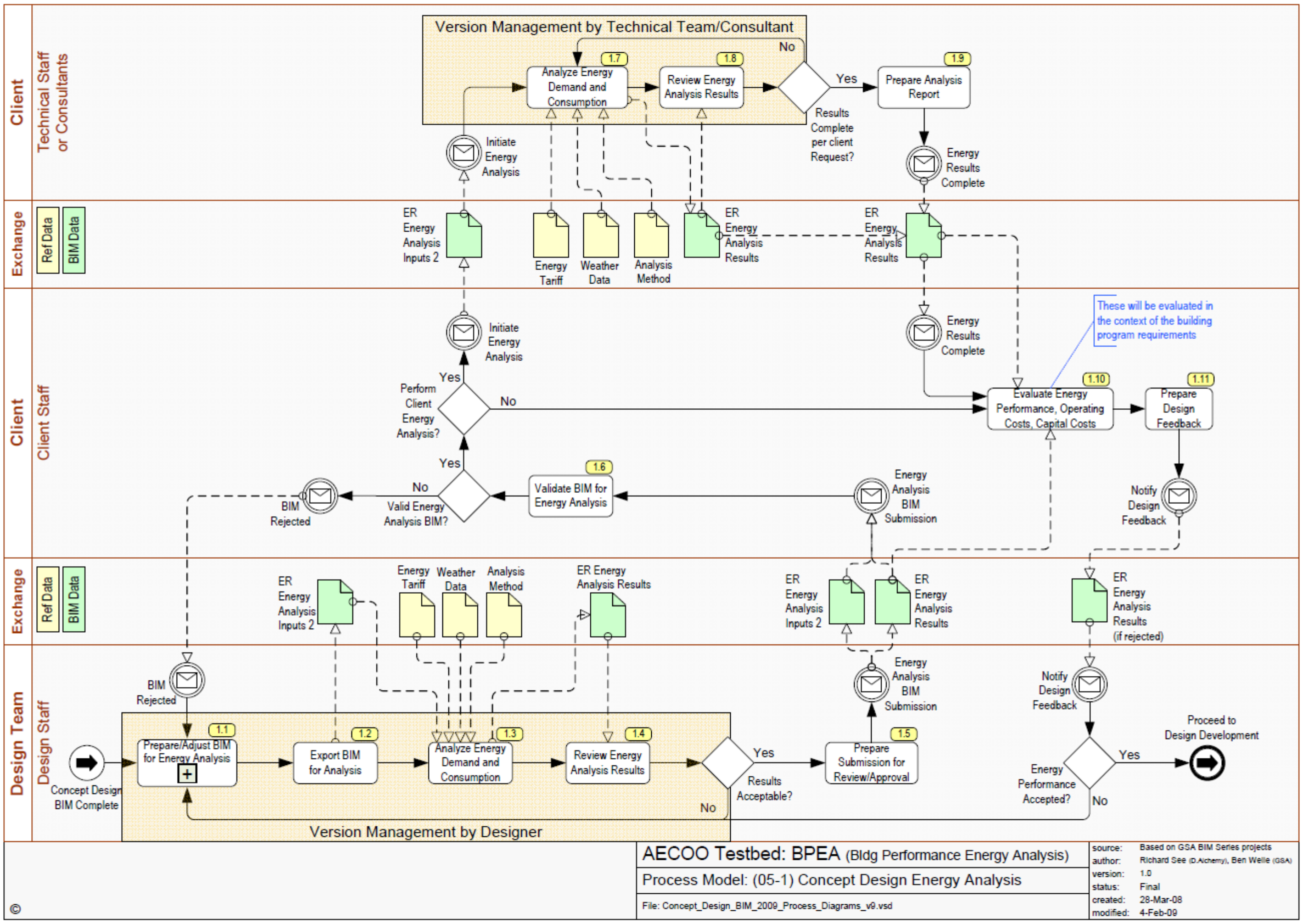
1.1.1.2 Detailed

This is the analysis work undertaken during the schematic and design development stages of the project and assumes the availability of geometric and building system information for the design. The overall process is the same at each stage of work, the difference being simply about the extent of the information available and the level of certainty that can be applied to the information. These factors impact the analysis methods used, which may range from relatively simple at the earlier design stages to detailed dynamic simulations at the later design stages.

Within this process map, the conceptual design phase of the project is shown.

1.2 Specification of Process

1.2.1 Concept Design Phase Energy Analysis



1.2.1.1 Concept Design BIM Complete

Type	Initial Concept BIM
Documentation	It is assumed at this point the architect has defined a building concept design complete with all the required building elements and space objects. This design provides a proposed building layout including functional and non-functional space configuration and placement of other geometric elements. Non-functional spaces such as technical spaces, circulation spaces, shafts, etc. must be defined by a space objects and not left as unidentifiable voids surrounded by geometry. Spaces that represent multi-story spaces such as atria and vertical distribution routes such as shafts, stairways and elevator shafts should be represented as distinct spaces at each level of the building that are related to each other vertically (either via an opening in a slab or an element located at the opening for e.g. safety purposes). The Concept Design BIM should include: o the site and building location o the building orientation including its relationship to true north o the site and building elevation above a reference datum o the building story information o 3D geometry of adjacent buildings o 3D geometry of the building, including walls (exterior/interior), curtain walls, roofs, floors/slabs, ceilings, windows/skylights, doors, and shading devices o space objects, including those defined by virtual space boundaries At the end of this task, the following exchange requirements from **ER Energy Analysis Inputs 1** should be met: *Project*, *Site*, *Site Context*, *Building*, and *Building Stories*. The following exchange requirements from **ER Energy Analysis Inputs 1** should be partially met: *Spaces* and *Building Elements (General)*.

1.2.1.2 Prepare/Adjust BIM for Energy Analysis [1.1]

Type	Sub-Process
Documentation	At this point, the Concept Design BIM is passed to the appropriate designer to prepare the BIM for energy analysis. The designer may still be the architect, a mechanical engineer or energy consultant, or any combination of those three. Details of this sub-process are described in Section 1.2.2.

1.2.1.3 Export BIM for Analysis [1.2]

Type	Task
Documentation	Once the BIM has been prepared for energy analysis and validated in Task 1.1, it is exported to IFC for energy simulation. At this point, all the required exchange requirements in **ER Energy Analysis Inputs** 2 have been met.

	Prior to being able to use the IFC file for energy analysis, there may need to be some additional data reduction/transformation steps that need to take place. One approach is to use a series of preprocessors or middleware to make these changes, such as LBNL's Geometry Simplification Tool (GST), IDF Generator, and/or IDF Editor. This sequence of tools enables the designer to convert the IFC information into an input file for energy simulation, in this case EnergyPlus. In the future, such a sequence of steps may be combined into a single "Import IFC" function that building performance software vendors may implement.

1.2.1.4 Analyze Energy Demand and Consumption [1.3]

Type	Task
Documentation	The designer is now almost ready to perform an energy analysis. After selecting the appropriate utility/energy tariff data, weather data, and analysis method, the simulation is run. The energy analysis will determine the energy demand (peak load) for the building in addition to the annual energy consumption. <u>Energy Demand</u> Energy demand is the heating and/or cooling load that may be used for the purposes of HVAC system sizing. It represents the maximum thermal load on the building for the specified design days for the winter and/or cooling season. Energy demand will be determined for each zone and the total demand obtained for the building (or parts of the building) by aggregating the zone peak loads for the specified design hour. Zone peak loads may or may not occur at the same as the building peak load. Energy demand will be determined based on the proposed building space layout, proposed construction types assigned to building elements, HVAC system, infiltration, outside air requirements, internal loads from people, lighting and equipment, and the operating schedules for occupancy, lighting, equipment, and HVAC. The designer must be cautious when evaluating simulation results, for the peak loads as determined for the specified design day may not necessarily end up being the peak loads the building experiences throughout the year. When this is the case, the user will most likely find that many of the spaces cannot maintain the required temperature setpoints for some period of the year. In energy simulation engines, this inability to maintain the required operating setpoints in the space usually is represented as the number of hours for a particular zone that fall outside of the specified temperature range, and this metric is frequently used as a measure of thermal comfort. <u>Annual Energy Consumption</u> Annual energy consumption is the energy used every year for heating, cooling, lighting, and equipment the building. Energy consumption may be determined for each space, zone, and/or as a total consumption for the building (or parts of the building). If energy consumption data is only calculated on the zone level, it may not be possible to determine individual space profiles within that zone.

1.2.1.5 Review Energy Analysis Results [1.4]

Type	Task
Documentation	The results of the energy simulation are obtained and evaluated. At this point, all the exchange requirements of the **ER Energy Analysis Results** should be met. The results may be evaluated directly from the energy simulation output, or the results may be checked using a BIM model checker using the IFC file with the results written back to it. Regardless of the chosen method, the results are compared to the energy targets set forth for the project. If the targets are not achieved, then the designer must go back to Task 1.1 and make further modifications to the building geometry, constructions, or some other building design variable. If the targets are achieved, the designer can move forward to Task 1.5. It is frequently the situation where the designer is evaluating a given design not just against its energy performance, but also against other performance targets such as first cost, circulation efficiency, etc. If a design meets the energy targets, but falls short of first cost targets, for example, and vice versa, then the design can be “failed” and designer will have to further iterate on the building design by returning to Task 1.1.

1.2.1.6 Prepare Submission for Review/Approval [1.5]

Type	Task
Documentation	Once the designer is satisfied with a design, they will prepare a submission package for client review/approval.

1.2.1.7 Validate BIM for Energy Analysis [1.6]

Type	Task
Documentation	After receipt of the IFC BIM complete with **ER Energy Analysis Inputs 2** and **ER Energy Analysis Results**, the client will use a data validation tool to verify that the BIM meets the requirement of the MVD.

1.2.1.8 Analyze Energy Demand and Consumption [1.7]

Type	Task
Documentation	The client may use internal staff or hire an outside consultant to verify the designer’s energy simulation results. After selecting the appropriate utility/tariff data, weather data, and analysis method, the simulation is run. The energy analysis will determine the energy demand (peak load) for the building in addition to the annual energy consumption. Details on energy demand and annual energy consumption can be found in Task 1.3.

1.2.1.9 Review Energy Analysis Results [1.8]

Type	Task
Documentation	The results of the client energy simulation are obtained and evaluated. The results are reviewed to ensure accuracy and integrity.

1.2.1.10 Prepare Analysis Report [1.9]

Type	Task
Documentation	Once the client simulation results are verified and approved, and analysis report is prepared comparing the results of the client simulation with those of the designer.

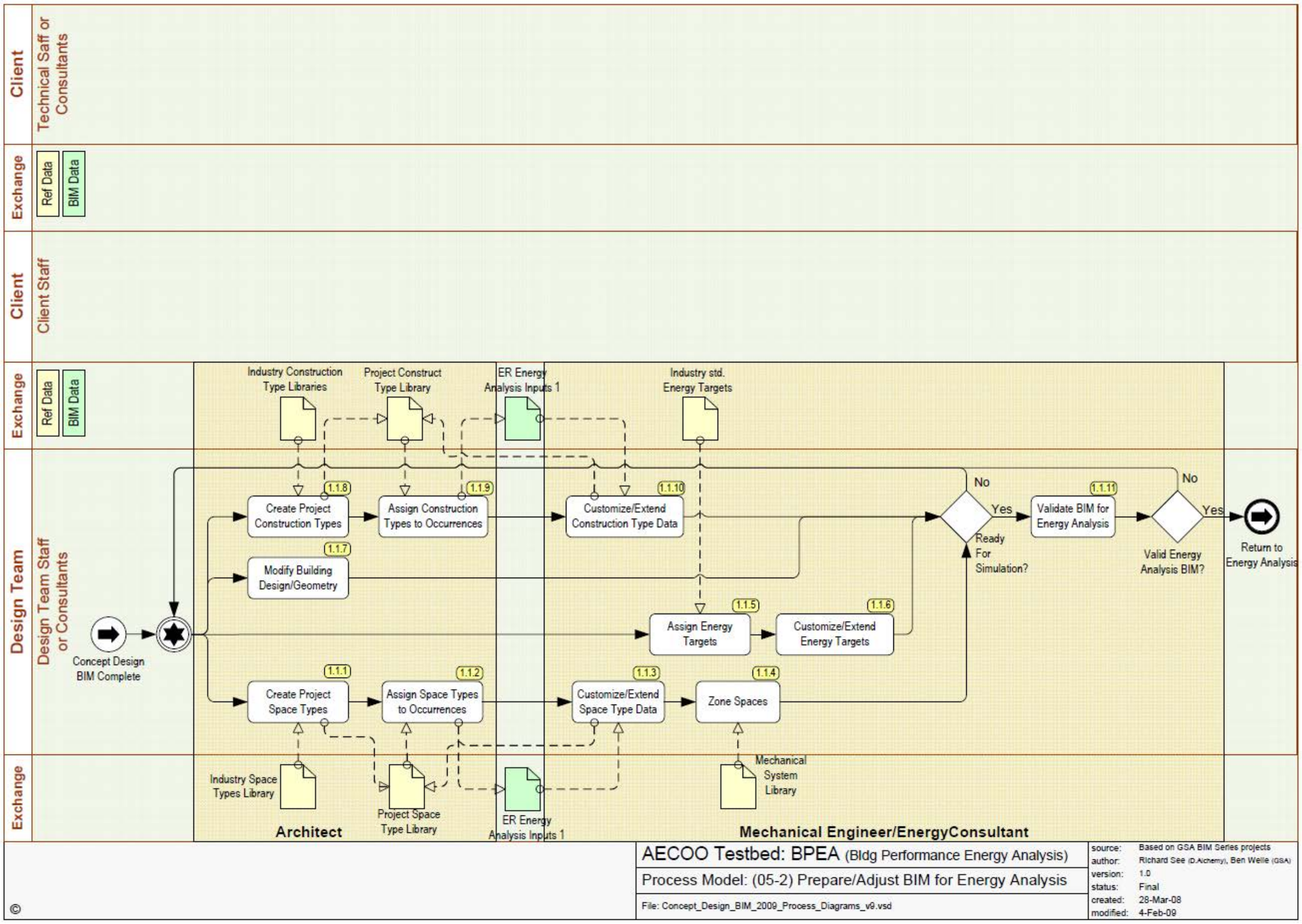
1.2.1.11 Evaluate Energy Performance, Operating Costs, Capital Costs [1.10]

Type	Task
Documentation	The client will evaluate the analysis report submitted by their internal staff or consultant. Energy performance, operating costs, and capital costs (in addition to any other building program requirements) will be evaluated, resulting in a "go/no go" decision for the design.

1.2.1.12 Prepare Design Feedback [1.11]

Type	Task
Documentation	The client will document the resulting energy analysis (which may or may not include an independent energy analysis for comparison/validation), projections, and recommendations for the design team. The design feedback package will be delivered back to the designer, and will include either an approval or rejection of the design originally submitted to the client by the designer. If the client performed an independent energy analysis and the design is rejected, the client will submit the new IFC file with the revised **ER Energy Analysis Results** back to the designer.

1.2.2 Prepare/Adjust BIM for Energy Analysis



1.2.2.1 Create Project Space Types [1.1.1]

Type	Task
Documentation	This process considers that an industry space type data library exists from which a project specific space type library can be derived. The space type selected drives assumptions for thermal performance characteristic of the space for energy simulation. The industry space type library may come from a variety of sources, including ASHRAE 90.1, ASHRAE 62.1, CA Title 24, or the IEEC. The industry space type library may be accessed from a server over the web or from directly within the BIM-authoring application. The project specific space type library contains only definitions of those space types that can be used on the project of concern. Space types that drive thermal simulation assumptions may also reference other classification systems, such as Omniclass. A single space object may have one, two, three, or more space types assigned to it based on the needs of the client. Multiple on-going projects between the GSA, Construction Specification Institute (CSI), the International Code Council (ICC), and others are working to map various naming classifications systems to each other. When this work is complete, consistent and transparent mapping of space names within BIM models will be possible. Project space data is expected to provide most of the following: o space type name o outside air requirements o internal loads for lighting, occupants, and equipment o space conditioning requirements o operating schedules for lighting, occupants, and equipment The default assumptions based on the project space type is meant to be a starting point only, and the values may be modified prior to running the simulation.

1.2.2.2 Assign Space Types to Occurrences [1.2.3]

Type	Task
Documentation	Once the project space type library has been created, the designer may assign the space types to space occurrences, making a connection between the space occurrence and the type of space to which it conforms.

1.2.2.3 Customize/Extend Space Type Data [1.1.4]

Type	Task
Documentation	This task deals with individual spaces that may not be fully defined within the project space type library, or not defined to the designer's satisfaction. Initial data may be taken from a library template but is then updated (or added) for the particular space being dealt with. Upon completion, information about this space may be saved back to the project space type library for future application. Examples include the designer wanting to lower a default ASHRAE value for interior lighting intensity because he/she wants to be more aggressive to meet LEED certification requirements, or adding a lighting schedule because the default space

	data from the industry standard space type library did not include one. At the end of this task, the following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be met: *Project, Site, Site Context, Building, Building Stories, Spaces, Spaces (Thermal Comfort Criteria), Spaces (Ventilation Criteria), and Spaces (Ventilation Design).* The following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be partially met: *Building Elements (General).*

1.2.2.4 Zone Spaces [1.1.4]

Type	Task
Documentation	At the heart of any energy simulation is the concept of a thermal zone. A thermal zone is a single space or group of indoor spaces that has uniform thermal load profiles and conditioning requirements. A simple way to think of a thermal zone is as a space that can effectively be conditioned using only one thermostat. Thermal zoning of a building helps the engineer determine the number and type of HVAC systems required. However, defining thermal zones requires a certain amount of engineering judgment. For example, perimeter offices all facing a similar orientation (N, S, E, W), could logically be combined into one thermal zone since the solar, occupancy, lighting, and equipment loads are all similar amongst all the offices. However, differences in personal thermal comfort may make it more prudent for the engineer to zone the offices into multiple thermal zones so that the occupants have more individual control over their environment. Strategies for thermal zoning can differ significantly by building type. For example, hotels frequently have multi-perimeter and core thermal zones due to the wide range of thermal conditions (e.g. some people like it warm, some like it cool). Small residences typically have only one conditioned thermal zone (one thermostat), plus unconditioned spaces such as unconditioned garages, attics, and crawlspaces, and unconditioned basements. When a designer "zones" spaces, he/she groups together individual spaces with similar thermal profiles and conditioning requirements into a single thermal zone. This thermal zone is typically served by a single HVAC system, though a single HVAC system can serve more than one thermal zone. Thermal zones need not contain contiguous spaces, an example being the creation of a single thermal zone for all the bathrooms in a building, despite there being bathrooms on multiple floors. Spaces are zoned in BIM-authoring applications in different ways, including drawing zone boundaries, picking spaces objects, and dragging and dropping spaces objects into zone objects. Included in this task is the assignment of the following zone information: o zone type o zone conditioning requirement o HVAC type o HVAC schedule o infiltration rate o daylighting data

	At the end of this task, the following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be met: *Project*, *Site*, *Site Context*, *Building*, and *Building Stories*, *Spaces*, *Spaces (Thermal Comfort Criteria)*, *Spaces (Ventilation Criteria)*, *Spaces (Ventilation Design)*, and *Energy Analysis Zones*. The following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be partially met: *Building Elements (General)*.

1.2.2.5 Assign Energy Targets [1.1.5]

Type	Task
Documentation	This process considers that an industry energy target data library exists from which data can be extracted and assigned to the building model. Energy target data provides metrics for energy performance goals. Possible units include: Btu/ft2, kWh/person, kWh/ft2 cooling, kWh/ft2 heating, kWh/ft2 by end use, etc. Targets may be based on ASHRAE 90.1, state or local codes, LEED requirements, or some other source. The default assumptions based on the energy target source data is meant to be a starting point only, and the values may be modified prior to running the simulation.

1.2.2.6 Customize/Extend Energy Targets [1.1.6]

Type	Task
Documentation	In this task the engineer or consultant modifies or adds data for energy targets. Initial data may be taken from a library template but is then updated (or added) for the particular building being modeled. At the end of this task, the following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be met: *Project*, *Site*, *Site Context*, *Building*, *Building (Energy Target*), *Building Stories*, *Spaces*, *Spaces (Thermal Comfort Criteria)*, *Spaces (Ventilation Criteria)*, *Spaces (Ventilation Design)*, and *Energy Analysis Zones*. The following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be partially met: *Building Elements (General)*.

1.2.2.7 Modify Building Design/Geometry [1.1.7]

Type	Task
Documentation	In this step, the designer makes any necessary modifications to the building geometry or any other building design parameter other than those addressed by project construction or space types. At the end of this task, the following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be met: *Project*, *Site*, *Site (Outside Design Criteria)*, *Site Context*, *Building*, *Building (Energy Target*), *Building Stories*, *Spaces*, *Spaces (Thermal Comfort Criteria)*, *Spaces (Ventilation Criteria)*, *Spaces (Ventilation*

	Design), Energy Analysis Zones, and Photovoltaics. The following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be partially met: *Building Elements (General)*.

1.2.2.8 Create Project Construction Types [1.1.8]

Type	Task
Documentation	This process considers that an industry construction type data library exists from which a project specific construction type library can be derived. The construction type selected for a building element significantly impacts the thermal performance of that element, based on the construction R-value, reflectance, transmittance, and thermal mass effects. The industry construction type library may come from a variety of sources, including the ASHRAE Fundamentals, ASHRAE 90.1, CA Title 24, and the IEEC. The industry construction type library may be accessed from a server over the web or from directly within the BIM-authoring application. The project specific construction type library contains only definitions of those construction types that can be used on the project of concern. Construction types that drive thermal simulation assumptions may also reference other classification systems, such as Omniclass. A single construction object may have one, two, three, or more construction types assigned to it based on the needs of the client Project construction data is expected to provide most of the following: o construction type name o material layer sequence for the construction o material layer thermal properties o overall thermal properties of the construction The default assumptions based on the project construction type is meant to be a starting point only, and the values may be modified prior to running the simulation.

1.2.2.9 Assign Construction Types to Occurrences [1.1.9]

Type	Task
Documentation	Once the project space type library has been created, the designer may assign the construction types to building element occurrences, making a connection between the building element occurrence and the type of construction to which it conforms.

1.2.2.10 Customize/Extend Construction Type Data [1.1.10]

Type	Task
Documentation	This task deals with individual constructions that may not be fully defined within the project construction type library, or not defined to the designer's satisfaction. Initial data may be taken from a library template but is then updated (or added) for the particular space being dealt with. Upon completion, information about this construction may be saved back to the project construction type library for future application.

	At the end of this task, the following exchange requirements from **ER Energy Analysis Inputs 1 and 2** should be met: *Project, Site, Site Context, Building, Building (Energy Target*), *Building Stories, Spaces, Spaces (Thermal Comfort Criteria), Spaces (Ventilation Criteria), Spaces (Ventilation Design), Building Elements (General), Building Elements (Opaque and Glazing), Material (Opaque), Material Layer (Opaque), Material Layer Set (Opaque),* and *Energy Analysis Zones*.

1.2.2.11 Validate BIM for Energy Analysis [1.1.11]

Type	Task
Documentation	After geometry, construction type, space type, and any other modifications to the building are made, the BIM is ready to be validated for energy analysis. Validation will take place by exporting an IFC file and using a model checker to ensure the MVD requirements have been met. The IFC file will contain 2nd level space boundaries, which define the heat transfer surfaces required for energy simulation. Space boundaries relate spaces and building elements. This is preferably done automatically by the BIM-authoring application, though it may be done by other means such as via a middleware.

1.3 Specification of Data Objects

1.3.1.1 Industry Construction Type Library

Type	Data Object
Documentation	The industry construction type data library provides information that drives assumptions for the thermal performance characteristics of constructions for energy simulation. The industry construction type library may come from a variety of sources, including the ASHRAE Fundamentals, ASHRAE 90.1, CA Title 24, and the IEEC. The industry construction type library may be accessed from a server over the web or from directly within the BIM-authoring application.

1.3.1.2 Project Construction Type Library

Type	Data Object
Documentation	The project construction type data library is derived for the project from the industry construction type library, and reflects any modifications or additions the designer has made to the industry source data.

1.3.1.3 Industry Space Type Library

Type	Data Object
Documentation	The industry space type data library provides information that drives assumptions for the thermal performance characteristics of spaces for energy simulation. The industry space type library may come from a variety of sources, including ASHRAE 90.1, ASHRAE 62.1, CA Title 24, or the IEEC. The industry space type library may be accessed from a server over the web or from directly within the BIM-authoring application.

1.3.1.4 Project Space Type Library

Type	Data Object
Documentation	The project space type data library is derived for the project from the industry space type library, and reflects any modifications or additions the designer has made to the industry source data.

1.3.1.5 Energy Target

Type	Data Object
Documentation	Energy target data provides metrics for energy performance goals. Possible units include: Btu/ft2, kWh/person, kWh/ft2 cooling, kWh/ft2 heating, kWh/ft2 by end use, etc. Targets may be based on ASHRAE 90.1, state or local codes, LEED requirements, or some other source.

1.3.1.6 Mechanical System Library

Type	Data Object
Documentation	The mechanical system library contains a variety of HVAC system types that the user may assign to zones in the BIM model. HVAC system type definitions may come from a wide variety of sources, including ASHRAE 90.1, Title 24, or EnergyPlus/DOE-2 libraries.

1.3.1.7 Analysis Method

Type	Data Object
Documentation	Select the method of analysis that is to be used during this stage of work. The method must be consistent with data that is available. The analysis method used refers to the thermal simulation engine or software interface selected for analysis (e.g. EnergyPlus, DOE-2, eQUEST, IES, etc.).

1.3.1.8 Energy Tariff

Type	Data Object
Documentation	Identifies the cost values that apply to the source of energy and its form of usage. During the early stages of design, information may be obtained from similar projects. As design progresses, information is obtained from the energy source provider. The tariff may be applicable not only to the energy source but also to when the energy source is used. For instance, electrical energy may carry a lower tariff when it is used in 'off peak' situations since such this may be useful to the source provider in load balancing.

1.3.1.9 Weather Data Library

Type	Data Object
Documentation	The weather data object provides annual (8760) weather data for use in the energy simulation. The source data for these weather data files varies, including data from Typical Meteorological Year (TMY, TMY2, TMY3), Weather Year for Energy

	Calculations (WYEC2), and International Weather for Energy Calculations format from ASHRAE (IWEC). Data file formats include EnergyPlus Weather Data (EPW) as well as ESP-r, DOE-2 and BLAST weather text format files. Some of the information that these files include is the following: o external temperature and humidity o solar radiation o wind speed o wind direction It is assumed that the weather data library provides any additional outside design criteria that is required. The outside design criteria drive the calculation of peak loads and HVAC equipment sizing, and may come from sources such as ASHRAE.

1.3.2 Exchange Requirement Data Objects

1.3.2.1 ER_EnergyAnalysis_Inputs_1

Type	Data Object
Name	ER_EnergyAnalysis_Inputs_1
Documentation	Exchange of partial set of energy simulation input information for peak load sizing and annual energy consumption calculations. This data exchange requirement is completed by the architect.

1.3.2.2 ER_EnergyAnalysis_Inputs_2

Type	Data Object
Name	ER_EnergyAnalysis_Inputs_2
Documentation	Exchange of complete set of energy simulation input information for peak load sizing and annual energy consumption calculations. This data exchange requirement is completed by the mechanical engineer and/or energy consultant.

1.3.2.3 ER_EnergyAnalysis_Results

Type	Data Object
Name	ER_EnergyAnalysis_Results
Documentation	Exchange of complete set of energy simulation output information including comfort metrics, peak load information, annual energy consumption, and utility rate information.

1.4 Specification of Decision Point Gateways

1.4.1.1 Ready for Simulation

Type	Decision Point
Documentation	At this point the designer must decide if all the desired design changes have been made and the model is ready for energy simulation. If so, the model is ready for

	simulation. If not, the designer must further modify the building design.

1.4.1.2 Valid Energy Analysis BIM?

Type	Decision Point
Documentation	After deciding that the model is ready for simulation, the designer uses a model checker to ensure that all the input exchange requirements have been met. This step also takes place when the client evaluates the BIM model submitted to them by the designer. If the BIM model meets the requirements set forth by the rule checking sets in the model checker, the BIM is valid. If not, it is invalid.

1.4.1.3 Results Acceptable?

Type	Decision Point
Documentation	The designer evaluates the results of the energy simulation and compares them to the energy targets for the design. If the design meets the energy targets, as well as any other project performance metrics (such as first cost), the results are acceptable. If not, the designer must further modify the building design.

1.4.1.4 Perform Client Energy Analysis?

Type	Decision Point
Documentation	The client may want to perform an independent energy analysis to validate the results of the designer's analysis. This independent energy analysis may be executed by internal staff of the client, or by a consultant.

1.4.1.5 Results Complete per Client Request?

Type	Decision Point
Documentation	The internal staff or consultant that is conducting the independent energy analysis decides of the results of their analysis are accurate and reliable, and conform to the client's work order.

1.4.1.6 Energy Performance Accepted?

Type	Decision Point
Documentation	The designer reviews the design feedback from the client for design approval or rejection.