D9-Carbon-Neutral **Lummus Park Hybrids** for Miami Beach

**Net-Zero-Energy | OFF-THE-GRID | SEA LEVEL RESILIENT | FLEXIBLE | CONTEXTUAL | Cutting-Edge**


**A R C 5362 (6 credits)**

**Instructors:** Assoc. Prof. Thomas Spiegelhalter (Coordinator D-9 MBUS, Co-Coordinator w. G. Read D-9 PCA) Claudia Busch, FIU-Associate in Design (BBA Berenblum Busch Architecture / Principal)

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**Busch:**

**Objectives:** Architectural Design 9 is a flexible sustainability studio that demands a high level of independent research and interdisciplinary joint collaboration with students from Landscape Architecture. It explores architectural projects of small to medium scale, applying innovative building technology to a highly spatial and reconfigurable organization. It is a Special Topics studio offering a flexible framework for investigating unique building, urban and/or theoretical sustainable landscape projects in the Lummus Park of South Beach. It demands a high level of independent research to support the development of a carbon-neutral design solution.

**Prerequisites:** ARC 5361 Comprehensive Design (with a grade of B- or better) and ARC 5343

**Digital Expertise:** A successful Design 9 student will use the available digital 3D-/4-D carbon neutral software platforms, cloud service and fabrication methods – 3-D sustainability modeling, clash detection design and 3-D printing, laser-cutting, CNC milling - to produce 3-D studies and scenarios, models/prototypes in order to test and refine the morphology and tectonic qualities of their systems, and ultimately aspire to fabricate enhanced components of the project to demonstrate the aesthetic effects and tectonic capacity of the design.

**Studio Project:** **Think, Design, Make, Perform, Communicate:** This D-9 studio will develop a variety of landscape architectural, holistic and urban proposals to aesthetically redefine the 74-acre Lummus Park with off-the-grid, carbon-neutral hybrids.

The 24 hrs x 365 days proposals will integrate and show case social-cultural activities ranging from sustainable practice demonstrations, living machines, environmental artist studios, healthy juice product bars with building integrated horticulture systems, biomimetic and biohybrid systems, neuromechanic and robot inspired sustainability hybrids, and other cutting edge design solutions and strategies. The average size of the hybrids is 100 m2 (1,076 sf2).

All 9-students will form interdisciplinary teams with landscape architecture students and will work together on sections of the Lummus Park in front of Ocean Dr., extending from 5th Street to 10th
Street. The Park has grassy areas, palm trees, sand volleyball courts, some other outdoor recreational facilities and crossed by a wavy promenade.

The D9 project will incorporate the mega events of the 100 years Miami Beach celebration activities (http://miamibeach100.com/) and will contribute futuristic solutions on sustainability, sea level rise resiliency and how off-the-grid, reconfigurable architecture can transform and joyfully adapt from gravity engineered structures to floating or diving objects in the next century.

The performative and sustainable design and engineering development complexity of the D9 final work will be supported by best practice examples and case studies such as the International Solar decathlon series in the U.S., Europe and China. Project specific design indicators and variables, detail, 2-D, 3-D planning as well communication data examples will be drawn from the following digital best practice archives:

Solar Decathlon U.S History link: http://www.solardecathlon.gov/history.html
Solar Decathlon Europe: http://www.solardecathlon.gov/sd_europe.html

Selected Archives for Project Documents:

(See download left under Construction Documents)

Historically, the Solar Decathlon is an international competition that challenges 20 collegiate teams to design, build, and operate the most attractive, effective, and water, material and energy-efficient solar-powered house. The winner of each of the competition is the team that best blends affordability, consumer appeal, and design excellence with optimal renewable energy production. The following.... criteria ....blabla:

- Urban & Beach Context, Landscape and Architecture
- Sustainability Market Appeal
- Architectural Detail and Functional Engineering
- Communications and Gaming
- Affordability and Payback
- Mixed Mode Thermal Comfort Zone
- Hot water
- Appliances and Furniture Design Performance
- Live/Work Entertainment
- Renewable Off-The-grid Energy Balance

Sources: 100 years Miami Beach: http://miamibeach100.com/
XXXXX: http://csnetwork.eu/livingmachines/conf2014/programme

Studio Reader: Xxxxxxxxxxxxxxxxxxxxx

Project Location: See attached .kmz google earth file of the D-9 Lummus Park area

CARBON-NEUTRAL DESIGN CONTEXT: “As evidence of climate change and global resource depletion grows, architects are increasingly challenged to design buildings that consume less energy. Buildings have already been attributed to over 40% of the total energy use that contributes to greenhouse gases in the United States, showing the alarming consequence of building design that relies heavily on fossil fuels. In response to these trends, the architectural industry and policy makers have continued to set new targets for energy performance. In 2009 the European Parliament agreed on a mandatory measure for all new buildings to achieve net zero energy by 2018, as part of the Energy Performance of Building Directive (EPBD). [1] France and Germany are moving beyond the E.U. requirements, mandating Energy-Plus Buildings in 2020, a standard Ireland aims for already in 2013.

In the United States the American Institute of Architects (AIA) adopted the 2030 Challenge as a voluntary program where participating buildings aim to achieve a 90% fossil fuel reduction for buildings by 2025, and carbon-neutrality by 2030. [2]
Also, in 2007, the U.S. Energy Independence and Security Act became law, requiring all new federal buildings and major renovations (except the private building sector) to meet the required energy performance standards of the 2030 Challenge beginning in 2010. (Fig. 1)

Fig. 3. Net-Zero Balance Graph of a NET-ZEB. Source: Author, based on IEA TASK 42Source: IEA TASK 42, accessed on 10/05/2011.

The goals of zero-fossil or carbon neutrality can be accomplished through innovative, energy efficient design strategies, highly insulated buildings, and the use of smart building technologies, energy efficient appliances, and application of onsite renewable technologies. “A so called zero-net-energy building offsets its annual energy and water consumption demand from onsite emission-free sources through renewable energy mix such as solar, wind, biomass, hydroelectric, and geothermal including energy from renewable sources produced on-site or nearby.” [1]

SOURCE:

REFERENCE:
AIA Pasadena 2030 Challenge: http://www.aiapf.org/cde.cfm?event=335767

Definitions and Software Links with Tutorials for Carbon-Neutral-Building Design are on page X

Carbon Neutral - Operating Energy

The base definition for Carbon Neutral Design is taken from www.architecture2030.org. Carbon neutral with respect to Operating Energy means using no fossil fuel GHG emitting energy to operate the building. Building operation includes heating, cooling and lighting. These targets may be accomplished by implementing innovative sustainable design strategies, generating on-site renewable power and/or purchasing (20% maximum) renewable energy and/or certified renewable energy credits. According to the Carbon Neutral Design Protocol Tool developed for this project, this includes Scope 1 Carbon due to Direct Emissions as well as Scope 2 Carbon due to Indirect Emissions. It is felt that at the present time, Operating Energy accounts for approximately 70% of the Carbon Emissions associated with a building.

Carbon Neutral - Operating Energy + Embodied Energy

This definition for Carbon Neutrality builds upon the definition above and also adds the Carbon that is a result of the Embodied Energy associated with the materials used to construct the building. This value is far more difficult to calculate. The initial embodied energy in buildings represents the non-renewable energy consumed in the acquisition of raw materials, their processing, manufacturing, transportation to site, and construction. This initial embodied energy has two components: Direct energy the energy used to transport building products to the site, and then to construct the building; and Indirect energy the energy used to acquire, process, and manufacture the building materials, including any transportation related to these activities.

The recurring embodied energy in buildings represents the non-renewable energy consumed to maintain, repair, restore, refurbish or replace materials, components or systems during the life of
the building. As buildings become more energy-efficient, the ratio of embodied energy to lifetime consumption increases. Clearly, for buildings claiming to be “zero-energy” or “autonomous”, the energy used in construction and final disposal takes on a new significance.

**Carbon Neutral - Operating Energy + Site Energy + Occupant Travel**

This definition of Carbon Neutrality builds upon the inclusion of Operating Energy and Embodied Energy, and also reflects the carbon costs associated with a building’s location. This requires a calculation of the personal carbon emissions associated with the means and distance of travel of all employees and visitors to the building. This is referred to as Scope 3 Carbon due to Indirect Emissions (organizational travel).

**ZED and CND Building Characteristics**

The design process for a Carbon Neutral Building is quite differently framed from a standard code compliant building. It is essential that an Integrated Design Process / Team Approach are used from the outset of the project to ensure success. The general characteristics of Zero Carbon Buildings begin to differentiate them from other buildings. There are rudimentary differences in the recognition of the site and climate as well as the pervasive incorporation of passive design principles.

**INSTRUCTIONAL OBJECTIVES**

See above. Additionally:

**NAAB Criteria**

**Design Thinking Skills:** Ability to raise clear and precise questions, use abstract ideas to interpret information, consider diverse points of view, reach well-reasoned conclusions, and test alternative outcomes against relevant criteria and standards.

**Site Design:** Ability to respond to site characteristics such as climate conditions, soil, topography, vegetation, and watershed in the development and detailing of a project design. *(See examples attached).*

**Sustainability:** Ability to design projects that optimize, conserve, or reuse natural and built resources, provide healthful environments for occupants/users, and reduce environmental impacts of building construction and operations on future generations through means such as carbon-neutral design, bioclimatic design, and energy efficiency.

**Investigative Skills:** Ability: to gather, assess, record, apply, and comparatively evaluate relevant information within architectural coursework and design processes.

**Ordering Systems:** Understanding of the fundamentals of both natural and formal ordering systems and the capacity of each to inform two and three-dimensional design.

**Structural Systems:** Understanding of the basic principles of structural behavior in withstanding gravity and lateral forces and the evolution, range, and appropriate application of contemporary structural systems.

**Building Envelope Systems:** Understanding of the basic principles involved in the appropriate application of building envelope systems and associated assemblies relative to fundamental performance, aesthetics, moisture transfer, durability, and energy and material resources.

**Environmental Systems:** Understanding the principles of environmental systems’ design such as embodied energy, active and passive heating and cooling, indoor air quality, solar orientation, daylighting and artificial illumination, and acoustics; including the use of appropriate performance assessment tools.

**Building Service Systems:** Understanding the basic principles involved in the appropriate application and performance of building services systems such as plumbing, electrical and mechanical systems.

**Building Materials and Assemblies:** Understanding the basic principles utilized in the appropriate selection of construction materials, products, components, and assemblies, based on their inherent characteristics of performance, including their environmental impact and reuse.
Technical documentation: Ability to make technical clear drawings, writes outline specifications, and prepares models illustrating and identifying the assembly of materials, systems, and components appropriate for building design.

Financial Considerations: Understanding of the fundamentals of building costs, such as acquisition costs, project financing and funding, financial feasibility, operational costs, and construction estimating with an emphasis on life-cycle cost accounting.

METHODOLOGY

Studio/lecture format. Meetings: Four hours and 15 minutes, two times per week. Students develop analytical intellectual positions and projects for review by instructor and visiting critics. Related readings are assigned and discussed regularly.

ATTENDANCE POLICY

Florida International University has NO provision for unexcused absences. Attendance at all classes is mandatory and expected for the full class period. FOUR (4) UNEXCUSED ABSENCES WILL RESULT IN FAILURE OF THIS CLASS.

All excuses are to be submitted in writing to the instructor for approval.

Students are highly encouraged to:
- Claim and inhabit space in the studio.
- Do their design work in the studio.
- Keep all process sketches, models, images, etc. in studio for consultation and evaluation.

The studio space will be accessible to students at all times. In order to ensure the safety of your persons and your property, the studio will be secured. It is additionally recommended those students bring padlocks to secure personal property. Students are encouraged to become familiar with the School of Architecture Studio Policy Statement. Civility and respect for the opinions, words, work and property of others shall be maintained at all times by all studio members.

RELIGIOUS HOLY DAYS

Any student may, by notifying the instructor clearly in advance, be excused from class to observe a religious holy day of his or her faith.

JURIES/REVIEWS

Mid-point and final review of your design work with faculty and area professionals

Interim partial/pin-up reviews will be held at the discretion of the studio instructor throughout the term. Attendance and participation in all juries and reviews is obligatory.

GRADING POLICY

Final review, mid-point review, interim reviews, class participation, and timely completion of assignments are all factored into the final grade for this course. Final and interim grades will be assigned in response to demonstrated competencies in oral, written, graphic and constructed communication of your design ideas and proposals. Grades will be assigned in accordance with the FIU performance level and grading guidelines as published in the Graduate Catalog and with the following as guide:

- Design Projects: 60%
- Research + Writing: 20%
- Design Development/ Participation 20%

A : 94-100 B+: 87-89 B: 80-83 C : 74-76 D+: 67-69 D: 60 -63

A+: 90-93 B+: 84-86 C+: 77-79 C: 70-73 D+: 64-66 F: 0-59

NO presentation may be missed except in the case of extraordinary circumstances. Students must provide an acceptable written excuse in advance. A grade of Incomplete (IN) will only be issued for unavoidable (and verifiable) circumstances beyond the student's control. Student must have a passing grade and be up to date with course work at the time that the request is made.

CELLULAR TELEPHONES

Mobile phones are to be turned off at all times during the period of studio instruction.

STUDENT RIGHTS + RESPONSIBILITIES:

It is the student's responsibility to obtain, become familiar with and abide by all Departmental, School and University requirements and regulations. These include, but are not limited to information contained in current editions of:

- The Florida International University Catalogue Division of Student Affairs Handbook of Rights and Responsibilities of Students
- School/Department of Architecture Curriculum and Program Sheets
- School/Department of Architecture Policies and Regulations

STUDENTS WITH

Students who need auxiliary aids or services to ensure access to academic
SPECIAL NEEDS

Programs should register with the Office of Disability Services for Students.

STUDENT WORK

The School of Architecture reserves the right to retain any and all student work for the purpose of record, exhibition and instruction. All students are encouraged to photograph and/or copy all work for personal records prior to submittal of originals to the instructor.

CIVILITY CLAUSE:

"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

SCHEDULE

See attached.

READING LIST

See attached.

Note: Schedule dates are subject to change. The instructor reserves the right to implement changes to this schedule as required.

Links for Tools and Tutorial for Carbon Neutral Design Software
SEMESTER SCHEDULE:
Note: Schedule dates are subject to change. The instructor reserves the right to implement changes to this schedule as required.
Phase 1 – ARC CHARRETTE
WK 1-3 The Charrette will begin on Tuesday 01/08
Presentation to jury Tuesday 1/21 at 5:30pm at MBUS.
Martin Luther King Holiday: January 20th (No Classes - University Closed)
Phase 2 - Carbon-Neutral Hybrid Complex
BRAINSTORMING: Precedents:
NOTE: STUDENTS HAVE TO DEVELOP THE PROGRAM AND SITE CRITERIA

ANALYSIS PHASE – DATA MINING
Jan 28/30  DUE: Precedent (Typology) presentations and parametric program diagrams with circulation and zoning volumes and layers

**WEEK 5**

Feb 4  Team and Group Research: Parametric program diagrams with infrastructure, landscape, circulation and all zoning volumes and layers

Feb 6  Lecture by Prof. Shahin Vassigh in our SET Lab, PCA 131:
- Geotechnical Aspects of the Planning and Building of High-Rises & Towers
- Load-bearing Structures and Structural Dynamics
- Sea Level Rise and Effects of Winds, Hurricanes and Tornadoes

**WEEK 6**

Feb 11  Schematic design: Infrastructure, landscape, circulation and all zoning volumes, building and façade structures, Isolation and shading

Feb 13  DUE: Schematic parametric program diagrams with infrastructure, landscape, circulation and all zoning volumes and layers

**WEEK 1**

1/13  WELCOME + ORIENTATION FIU PCA 135

1/15  FIU-MBUS WELCOME Sessions and
SITE ANALYSIS PHASE – DATA MINING
Mixed Landscape Architect and Architecture Student Team and Group Research Organisaton:
1. Parametric program diagrams with micro-climatic, infrastructure, landscape, circulation and all zoning volumes and layers,
2. Precedents of design/built/operated hybrids in hot/arid and subtropical climates

**WEEK 2**

1/19  MLK HOLIDAY / UNIVERSITY CLOSED

1/22  SITE ANALYSIS PHASE – DATA MINING
GROUP RESEARCH PRESENTATIONS:
1. Parametric program diagrams with micro-climatic, infrastructure, landscape, circulation and all zoning volumes and layers,
2. Precedents of design/built/operated hybrids in hot/arid and subtropical climates
5PM: LECTURE / ARC: Lecturer TBD

**WEEK 3**

1/27  2PM: STUDIO MODULE 1*: ARCHITECTURE
Intro for Schematic design: Micro-climatic Hybrids with contextual infrastructure, landscape, circulation and all zoning volumes, building and façade structures, isolation and shading

1/29  Desk Critics: Schematic design: Micro-climatic Hybrids with contextual infrastructure, landscape, circulation and all zoning volumes, building and façade structures, isolation and shading
5PM: LECTURE / LAEUD: Rob Lloyd / ArquitectonicaGEO / Port Tunnel Miami

**WEEK 4**

2/3  Desk Critics: Schematic design: Micro-climatic Hybrids with contextual infrastructure, landscape, circulation and all zoning volumes, building and façade structures, isolation and shading
5PM: LECTURE / ARC: David Fano / FIU Alumnus

2/5  2PM: STUDIO MODULE 2: LANDSCAPE
Desk Critics: Schematic design: Micro-climatic Hybrids with contextual infrastructure, landscape, circulation and all zoning volumes, building and façade structures, isolation and shading

**WEEK 5**

2/10  Desk Critics: Schematic design: Micro-climatic Hybrids with contextual infrastructure, landscape, circulation and all zoning volumes, building and façade structures, isolation and shading

2/12  Desk Critics: Schematic design: Micro-climatic Hybrids with contextual infrastructure, landscape, circulation and all zoning volumes, building and façade structures, isolation and shading
5PM: LECTURE / LAEUD: Randy Hollingworth / Landscape Architect

**WEEK 6**

2/17  2PM: STUDIO MODULE 3*: ARCHITECTURE

2/19  5PM: LECTURE / ARC: Lecturer TBD

**WEEK 7**

2/24  2/26  5PM: LECTURE / ARC: Lecturer TBD
ARC 5362  Graduate Design 9, FIU College of Architecture + The Arts, Miami Beach Urban Studios, Spring 2015

3/3  MIDTERM
3/5  MIDTERM
   5PM: LECTURE / ARC: Lecturer TBD"

WEEK 9
3/10  SPRING BREAK / UNIVERSITY OPEN
3/12  SPRING BREAK / UNIVERSITY OPEN

WEEK 10
3/17  MIDTERM
3/19  MIDTERM
   5PM: LECTURE / LAEUD: Enzo Enea

WEEK 11
3/24
3/26  2PM: STUDIO MODULE 4: LANDSCAPE

WEEK 12
3/31
4/2   5PM: LECTURE / ARC: Lecturer TBD

WEEK 13
4/7   2PM: STUDIO MODULE 5: LANDSCAPE
4/9

WEEK 14
4/14
4/16

WEEK 15
4/21  FINAL REVIEWS
4/23  FINAL REVIEWS

WEEK 16
4/28  FINAL REVIEWS
4/30  FINAL REVIEWS

FINAL REVIEW REQUIREMENTS

MODELS
   1 Large building model  (scale to be determined ¼" = 1'-0" or other)
   1 Large detail model  (scale to be determined 3" = 1' or other)
   Model must show: Structure, HVAC components, electrical, lighting, plumbing components, enclosure components including exterior cladding, insulation barriers, acoustic treatment, waterproofing, etc.

DRAWINGS (REVIT) GENERAL
G1  Cover page to include project ID, location map (North arrow), list of drawings and your name.
G2  Context site plan showing streets, adjacent properties, sidewalks, street trees, traffic lanes, North arrow, Climate data, Wind-, Sun Side projection angles in sectional diagrams (not in axonometric angles!)
G3  Load (Circulation/Occupancy/Resource) diagrams + program Distribution diagrams
G4  Main street elevation showing entire city block with detailed depiction of existing buildings and new building
G5  1 exterior rendering (3D) and 1 sectional rendering (3D)
G6  1 large scale axonometric to match detail model
G7, 8, 9…  Prefabrication: Parts, Assembly:

CIVIL/ SITE
C1  Site/ Weather/ Building + Site Parameters (HDD, CDD, precipitation, Sun/ incident solar radiation, wind patterns, temperature, humidity, etc.)
C2  Site Plan and sections showing topography, drainage, site water management and treatment systems with scaled and color coded legends

ARCHITECTURAL  ALL FLOOR PLANS MUST INCLUDE A NORTH ARROW
A1, 2, 3, 4… Floor plans, scale ¼", label appropriately.
A Building elevations, scale ¼", label appropriately.
A Two building sections, scale ¼", label appropriately.
A Wall sections ¼" = 1'-0"
A One ceiling plan, scale ¼", must show: all lighting fixtures, all A/C supply and return registers, ceiling materials.
A Roof plan, scale ¼", must show: roofing materials, skylights, vents, PV arrays, roof slopes indicating high and low points, and any other equipment or architecturally relevant feature.
A Material Specifications

ADA UNIVERSAL ACCESSIBILITY
ADA1 Summarize in diagrammatic form, how your building will comply with ADA and Universal Accessibility code requirements in public access areas. Show diagrammatic drawings of: corridors with appropriate width, ramps, stairs, door openings, thresholds, door swings, water fountains, hand rails, counter clearances etc. (See handicapped bathroom below).
ADA2 Large scale detailing of a handicapped ramp and bathroom, ½". Show plan and all elevations to appropriately document all required fixtures including location and specification for mirror, faucet, grab bars etc.

STRUCTURAL PLANS MUST SHOW STRUCTURAL ADAPTABILITY SCENARIOS FOR THE SELECTED FLAT AND/OR OTHER SLOPED SITES
S1 Foundation plan
S2 Floor plan(s) showing all major structural components
S3 Section/ perspective showing all major structural components
S4 Axonometric or 3D framing building structure, or picture of the physical structural model
S5 Showing all elements of prefabrication strategy

FINAL REVIEW REQUIREMENTS (2)
MECHANICAL PLANS MUST BE LABELED APPROPRIATELY
(Passive/Active) On main floor mechanical plan, show location of all major mechanical components including but not limited to passive and active water, and/or water/air based HVAC systems including energy generation systems: PV/Solar thermal, geothermal, etc; conversion systems: thermo-active modules, boiler, chiller, heat-recovery, compressors, air handling units, ventilation systems, grills and shafts, mechanical chases, etc
M1 1 Building section showing all major passive and active mechanical system components
M3 Systems Specifications
ELECTRICAL PLANS MUST BE APPROPRIATELY LABELED.
E1 On main floor electrical plan, show location of all major electrical components including but not limited to: meter location, electrical chases, --wire runners, security or other digital systems, electrical, fire alarms, smoke alarms, electrical panels and electrical outlets.
E2 On a reflected ceiling plan show: switches and wire connections to lamps, lamp location and schedule, exterior lighting, alarm systems, etc
PLUMBING PLANS MUST BE APPROPRIATELY LABELED.
P1 On main floor plumbing plan, show: fresh water lines, hot water lines, hot water heaters, rainwater collection, and/or gray water reuse, sewer lines, plumbing chases, storm water lines and leader locations, infrastructural connections to street, plumbing fixtures, bathrooms.
P2 Materials and fixture specs

SUSTAINABILITY
SUS1 Whole-Building Energy Analysis with Ecotect, Vasari, Green Building Studio or similar Cloud Service Tools: calculate the total estimated energy use and carbon emissions of the building model on annual, monthly, daily, and hourly basis, using a global database of weather information.
Report Carbon Dioxide (CO2) Emissions for nearly all aspects of the proposed building, including on-site fuel use as well as emissions from power plants.
Summarized water usage inside and outside the building, based on the number of occupants as well as the building type. Using LEED V3 (2010) scoring chart, demonstrate that your project meets the criteria for a Platinum Rating score, and all needed operational energy for cooling, heating and electricity is matched with non-fossil resources (renewable energy on site).

Reference Texts:

Required Software:
Autodesk Vasari
http://labs.autodesk.com/utilities/vasari/

Autodesk Ecotect Analysis
http://usa.autodesk.com/ecotect-analysis/

Autodesk® BIM 360 Building Information Modeling
http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=19676436

Autodesk® BIM 360 services enable efficient and easy-to-use Building Information Modeling (BIM) workflows for detecting and coordinating clashes, simulation, and visualization

Autodesk Inventor - Digital Prototyping
http://usa.autodesk.com/digital-prototyping/

DIVA-for-Rhino
http://diva4rhino.com/

DIVA-for-Rhino is a highly optimized daylighting and energy modeling plug-in for the Rhinoceros - NURBS modeler. The plug-in was initially developed at the Graduate School of Design at Harvard University and is now distributed and developed by Solemma LLC. DIVA-for-Rhino allows users to carry out a series of environmental performance evaluations of individual buildings and urban landscapes including Radiation Maps, Photorealistic Renderings, Climate-Based Daylighting Metrics, Annual and Individual Time Step Glare Analysis, LEED and CHPS Daylighting Compliance, and Single Thermal Zone Energy and Load Calculations.

Sketchup Green Studio
The IES VE SketchUp plug-in
http://www.sketchup.com/green/analysis.html

Integrated Environmental Solutions (IES) has launched a plug-in for Google SketchUp that delivers energy and carbon footprint simulations to inform early-stage design decisions. The free plug-in provides results without any additional software, although owners of IES’s Virtual Environment package or its VE-Toolkits can perform additional analyses, such as daylight or airflow modeling. The plug-in provides functionality from SketchUp that IES previously offered only from Autodesk’s Revit Architecture and Revit MEP, including documentation for the LEED daylighting credit. Beginning with a SketchUp model, the plug-in prompts a user to define the building’s location (if it isn’t already linked to a location in Google Earth). Using a series of pull-down menus, the user assigns the building’s function, the type of mechanical system, how the building envelope is constructed, and, optionally, the uses of specific spaces within the building. Based on these definitions, the software assigns default values for typical occupancy schedules and internal energy loads.

Legacy OpenStudio Plug-in for Google SketchUp
http://apps1.eere.energy.gov/buildings/energyplus/openstudio.cfm

Further Suggested

Useful Online Tools:
Details and Building Systems Online Portal (Languages: German, French, Spanish, Italian, English, Japanese, Swedish) http://www.detail.de/thema_architecture-magazine-construction_57_En.htm
DOE tools: http://apps1.eere.energy.gov/buildings/tools_directory/
ASHRAE: http://www.ashrae.org/
IESNA: http://www.iesna.org/
Energy Star: http://www.energystar.gov/