

E. ENERGY AND ATMOSPHERE

1.0 Optimize Energy Performance: Reduce Design Energy Cost

Energy and Atmosphere Credits 1.1 – 1.5: 10 (ten) points

Objective: Achieve increasing levels of energy performance above the prerequisite standard to reduce environmental impacts associated with excessive energy use.

Narrative: The project follows California's Title 24 energy standards. The overall energy cost is 65.7% lower than Title 24 standards, qualifying for a total of ten (10) energy performance points.

Projects and Activities: The design energy cost was lower compared to the energy cost budget for regulated energy components described in the requirements of American Society of Heating, Refrigerating, Air-conditioning Engineers (ASHRAE)/IESNA Standard 90.1-1999, as demonstrated by the whole building simulation using the Energy Cost Budget Method described in Attachment 'H' To earn these credits, the Agency's energy cost budget was set at 65.7% better than Title 24 requirements. Key components of the building that were identified as impacting the energy cost were the central plant, air distribution, envelope, lighting, and renewable and recovered energy. These components were evaluated, and below are descriptions of how they were operated to achieve the expected energy savings:

Central Plant

1. Hot water (used for space heating and for driving the absorption chillers) will be heated by waste heat recovered from IEUA-owned and operated internal combustion engine-generator sets located near the two administration buildings. The waste heat generated by the internal combustion engines will be well in excess of the amount required to heat water to serve the buildings' heating and cooling loads.
2. Chilled water is provided by four 30-ton, 1-stage gas absorption chillers, each with a Coefficient of Performance (COP) of 1.43. The heat source used to drive the chillers will be waste heat generated in the power generation process (described above). Thus, most of the energy required to run the chillers will be site-recovered energy. (A small amount of electricity is also required, and is included in the energy model). The Title-24 baseline comparison uses Direct Exchange (DX) electric cooling (see above for explanation of Title-24 baseline systems).
3. The chilled water pumps and the heating hot water pumps have variable speed drives, which helps save energy and improve the system performance.

4. The existing cooling tower has a single-speed fan and constant speed pumps, however, it is temporary and will be replaced with a pumped cooling water system using Regional Plant No. 5 secondary effluent for higher performance and energy saving.



Central Plant (cooling tower and absorption chillers)

Air Distribution

1. The main air-handling units have variable speed fans. Fan energy for the two buildings is approximately 12% less than the fan energy in the standard case due to lower cooling loads (resulting from the well-designed building envelopes and efficient lighting systems).
2. Terminal units are Variable Air Volume (VAV) with reheat in the perimeter zones and VAV on the interior zones. Since the baseline energy model has reheat in all zones (perimeter and interior), significant energy savings are achieved in the proposed case.

Envelope

1. The majority of the vertical glazing is Sungate 100, low-e glass with $U\text{-value} = 0.32$, $SHGC = 0.51$. The $U\text{-value}$, which is lower than the Title-24 requirement, reduces conductive heat gain through the windows. Storefront glazing is Solex single-pane, with $U\text{-value} = 1.09$, and $SHGC = 0.60$. Skylights are Kalwall construction with a $U\text{-value}$ of 0.20 and a $SHGC$ of 0.30.
2. The walls are 8-inch thick concrete walls with R11 insulation on the interior surface of the walls.
3. The roof is an R-30 built-up roof with a cool roof coating.

Lighting

The lighting in both buildings consists mostly of suspended fluorescent fixtures with T8 lamps, and compact fluorescent lamps. The installed lighting power density (including task lighting) for

the buildings is 0.893 watts/ft² for Building A, and 0.747 watts/ft² for Building B. Title-24 also awards a credit of 40% for continuously dimmable daylighting controls where sufficient daylighting is available. Both IEUA headquarters buildings have an extensive amount of skylights designed to provide daylight evenly throughout the building. Approximately 47% of the lighting in Building A, and 64% of the lighting in Building B, is controlled with daylighting sensor controls and continuously dimmable ballasts. With the daylighting control credits, lighting power density (including task lighting) for Building A is 0.724 watts/ft², and for Building B is 0.557 watts/ft². These values include credits for daylighting sensor controls with continuously dimmable ballasts.



Skylight in Interior Lobby Area



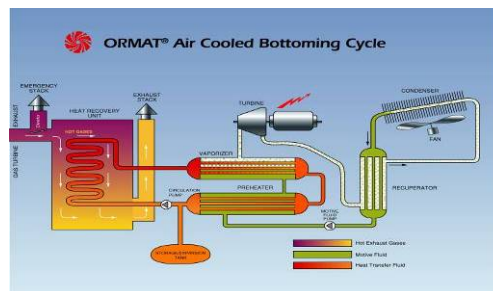
Interior Light Fixtures

Renewable and Site-Recovered Energy

1. **Photovoltaics:** 71 kW of photovoltaics are located on the roofs of the two headquarters buildings (Note: this is the rated kW for the purposes of the photovoltaics analysis. A value of 66 kW was used to account for the conversion from DC to AC voltage). These photovoltaics generate 117,091 kWh of energy annually, resulting in a \$10,665 annual electricity cost savings (representing 24.4% of the total regulated building energy cost).
2. **Waste heat recovery from power generation process:** IEUA generates power at a plant located near its two headquarters buildings. Waste heat from the power generation process is used to provide all of the space heating hot water to the buildings, and drives the gas absorption chillers. Approximately 22,526 therms of natural gas usage is offset by this waste heat recovery, resulting in a \$14,462 annual natural gas cost savings (representing 40.6% of the total regulated building energy cost).



Photovoltaic Panels



Gas Absorption Chiller System

2.0 Renewable Energy

Energy and Atmosphere Credit 2.1-2.3: 3 (three) points

Objective: Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

Narrative: The project has installed a 66kW rooftop photovoltaic array capable of generating approximately 117,000kWh annually. The installation will supply 24.39% of the total project's energy, earning all three (3) renewable energy points. The array is comprised of multiple panel types and configurations. The individual panel array will be separately monitored and compared to determine actual system performance. Data regarding systems performance will be collected by IEUA and published to provide education for potential photovoltaic customers.

Projects and Activities: A fraction of the building's total energy use (as expressed as a fraction of annual energy cost) was supplied through the use of on-site renewable energy systems.

The table below provides information on products considered and a list of companies that supply these products. **Please note:** this list should not be considered as a recommendation. Individuals/organizations using this information are responsible for researching the products and companies prior to engaging in any business agreement.

Product Used	Company	Address	Phone	Fax	Web Site
Photovoltaic Module	Astro Power, Inc.	300 Executive Dr. Newark, DE 19720	302-366-0400	302-368-6474	www.astropower.com
Photovoltaic Module	ASE Americas, Inc.	4 Suburban Park Dr. Billerica, MA 01821	978-667-5900	978-663-2868	www.asepv.com
Photovoltaic Module	Evergreen Solar	256 Cedar Hill St. Marlboro, MA 01752	508-357-2221	508-357-2279	www.evergreensolar.com
Photovoltaic Module	First Solar, LLC	4050 East Cotton Center Suite 6-68 Phoenix, AZ 85040	602-414-9300	602-414- 9400	www.firstsolar.com
Photovoltaic module	Bekaert ECD, Solar Systems, LLC	3800 Lapeer Rd. Auburn Hills, MI 48326	248-475-0100	248-364-0510	www.uni-solar.com
Photovoltaic Module	Shell Solar	P.O Box 849 5700 AV Helmond, The Netherlands	+31 492-508 751	31-492-508-700	www.shellsolar.com
Photovoltaic Module	Sharp Electronics	5901 Bolsa Ave. Huntington Beach, CA 92647	800-237-4277	714-903-4802	www.sharppusa.com
Photovoltaic Module	SMA America, Inc.	20830 Red Dog Rd. Grass Valley, CA 95945	530-273-4895	530-274-7271	www.SMA-AMERICA.com
Photovoltaic Module	Xantrex Technology Inc.	161-G S Vasco Rd. Livermore, CA 94550	925-245-5400	925-245-1022	www.xantrex.com
Photovoltaic Module	BP Solar	630 Solarex Court Frederick, MD 21703	301-698-4200	301-698-4201	www.bpsolar.com

3.0 Additional Commissioning

Energy and Atmosphere Credit 3.0: 1 (one) point

Objective: Verify and ensure that the entire building is designed, constructed and calibrated to operate as intended.

Narrative: CTG Energetic, Inc. is the third party commissioning authority for the project. See Attachment 'I' for certification letters and documentation that demonstrates the required elements for additional commissioning have been achieved.

Projects and Activities: In addition to the Fundamental Building Commissioning prerequisite, the following additional commissioning tasks were implemented: conduction of a focused review of the design prior to the construction documents phase; conduction of a focused review of the construction documents close to project completion; conduction of a selective review of contractor submittals of commissioned equipment; (The above three reviews were performed by someone other than the designer) development of a re-commissioning management manual; and preparation of a contract for a near-warranty end or post occupancy review.

The table below provides information on products considered and a list of companies that supply these products. **Please note:** this list should not be considered as a recommendation. Individuals/organizations using this information are responsible for researching the products and companies prior to engaging in any business agreement.

Product Used	Company	Address	Phone	Fax	Web Site
Third Party Commissioning Authority	CTG Energetic, Inc.	16 Technology Dr. Suite 109 Irvine, CA 92618	949-790-0010	949-790-0020	www.ctg-net.com

4.0 Ozone Depletion

Energy and Atmosphere Credit 4.0: 1 (one) point

Objective: Reduce ozone depletion and support early compliance with the Montreal Protocols.

Requirements: Install base building level Heating Ventilation and Air Conditioning (HVAC) and refrigeration equipment and fire suppression systems that do not contain Hydro Chlorofluorocarbons (HCFCs) or Halon.

Narrative: The refrigerant used in the building's Heating Ventilation Air Conditioning and Rating (HVAC&R) equipment is R134A and is HCFC-free.

Projects and Activities: The base building level HVAC and refrigeration equipment and fire suppression systems installed did not contain HCFC's or Halon.

The table below provides information on products considered and a list of companies that supply these products. **Please note:** this list should not be considered as a recommendation. Individuals/organizations using this information are responsible for researching the products and companies prior to engaging in any business agreement.

Product Used	Company	Address	Phone	Fax	Web Site
Yazaki Water Cooled Gas Absorption Chillers	John D. Howell & Associates	119 E. King St. Johnson City, TN 37605	800-929-8548	800-929-9506	www.hydronics.com
DryStar Refrigerated Dryer with R134A Refrigerant	Ingersoll-Rand-Air Solutions Group	200 Chestnut Ridge Rd Woodcliff Lake, NJ 07677	201-573-0123	201-573-3172	www.irco.com