Resources for Renovated and New Dwellings with Integrated Systems

Homes should be beautiful and functional, inside and out; after all, people live in them! Here are some characteristics of homes Synertech believes are practical yet elegant. Although these homes include a number of energy and environmental features not often found even in very expensive dwellings, these features are integrated carefully with attention to each other and to the entire space. The result is an organic whole that coheres with the environment in natural ways—and whose energy bills are tiny.

Click here to download a presentation on approaches to achieving close-to-zero-energy homes.

Living Environment Safe and Comfortable

***Toxins, volatile organic compounds, irritants not employed at all or removed from dwelling;**

***Conditioned envelope defined with care to ensure that toxins cannot enter from outside soil or air.**

***Conditioned envelope thoroughly air sealed—a process that is aided by blower door and infrared technologies.**

***Air-to-air heat exchanger installed and carefully controlled to ensure good indoor air quality while recovering waste heat. Filters or other air cleaners can be installed to make certain air is as healthy as possible. Modest fan power, high-quality fans, and carefully-designed ducts result in good performance that is virtually noise free.**

***No ducting used except for air-to-air heat exchanger. Instead, radiant heat is delivered via simple hydronic system. (Click here to download the Fall edition of the Boulder Green Building Journal, which includes an article on radiant heating.)**

***High-quality evaporative cooling/whole house fan for summer months (in climate zones which allow them) ensures fresh air that is filtered and cleaned at minimal energy cost. Cooler can be mounted inside attic space; intake from gable. Excellent air quality and comfort, thermostatically controlled, venting via "up ducts" (insulated back-draft dampers) in attic ensures automatic operation without the need to open windows unless desired.**

***Ventilation strategies remove objectionable odors at source with minimal energy use and noise.**

***In combination with other measures below, entire home is acoustically quite elegant; there is very little noise from outside or from space conditioning equipment, while there are**

excellent acoustics for listening to the output of modern stereo equipment throughout home.

Energy Efficiency and Solar Thermal Measures

***Super insulation of conditioned envelope from four feet below grade completely around the envelope with no gaps minimizes conductive losses, just as careful air sealing minimizes convective losses.**

***Exterior insulating shutters control radiative losses and gains, raise the efficiency of fenestration systems by a factor of five, and enhance aesthetics of home. (Shutters operate automatically to maximize energy efficiency and comfort; may be overridden by the push of a button on a wireless remote.)**

***Dwelling heated by a carefully-integrated combination of passive solar and radiant distribution system, the latter installed in ceilings, walls, or floors.**

***Radiant heat supplied by a flat plate (or evacuated tube) active solar system via a large, super-insulated tank that sustains home for many cloudy days. Small back-up is supplied from a very-efficient, gas-fired boiler (if needed at all).**

***Active solar domestic hot water delivered from plenum directly to each point of use using small-diameter, flexible piping minimizes losses, maximizes convenience.**

***Cold water delivered via similar mechanism ensures good pressure at each outlet.**

***Shower designed for maximum comfort, ease of maintenance, while limiting water and energy waste [see shower article from BGBJ Vol 1 Number 1.**

***Natural daylighting via innovative new technology devices that produce excellent, glare-free lighting with minimal thermal losses to the outside of the envelope.**

***Electric lighting systems via energy-efficient lamps in luminaires that allow for establishing a variety of lighting environments to suit function and mood.**

***All appliances ENERGY STAR rated except for clothes line at top of solar space which out-performs the dryer, aids in supplying humidity, and minimizes wear on clothes.**

Photo Voltaic System

***Carefully designed to match energy efficient features of the dwelling, maintain esthetic charm of home.**

***Associated control system allows for selling excess power generated to utility, while using the utility/PV as back up when needed.**

***Timer-controlled outlets allow devices which use electricity even when switched off to be controlled.**

Other Features

***Cable available in most spaces for TV, broad band internet, accomodations for wireless internet; home wired to allow connecting speakers to amplifiers, etc.**

***Key energy and security systems are monitored, may be accessed from anywhere via the World Wide Web through password-protected access.**

***Combination of energy features ensures that pipes will never freeze even during extended period of cold, cloudy weather.**

***Landscaping includes attractive gardens designed for local climate conditions. Systems designed to require very minimal maintenance and last for a long time.**

***Dwelling comes with "operator's manual" that explains home features and controls, includes warranties for all key systems.**

***Possibility for supplying solar hot water for space conditioning and domestic hot water via a district heating system. This substantially simplifies equipment requirements for each dwelling on the loop, allows economies of scale for solar system. Result is lower cost for equipment, lower cost for energy, greater system reliability, and lower maintenance costs.**