DOW™-KNIGHT CI-SYSTEM AND LEED

Dow Building Solutions & Knight Wall Systems are active supporters of the "green building" efforts. Among their many affiliations and alignments with organizations dedicated to sustainable design and construction, Dow & Knight are members of the U.S. Green Building Council (USGBC), a nonprofit coalition that promotes high-performance green building design.

The USGBC Leadership in Energy and Environmental Design (LEED) system is the nationally accepted benchmark for the design, construction and operation of high-performance green buildings.

The voluntary, consensus-based rating system lets design professionals accumulate credits based on meeting criteria for the use of environmentally friendly, sustainable and energy-efficient products and systems.

By reaching certain point levels, buildings can be LEED rated as: certified, silver, gold or platinum. In some states and localities, LEED certification can result in financial incentives.

DOW™-KNIGHT CI-SYSTEM

More than an insulated wall, the DOW™-KNIGHT CI-System eliminates the need for batt insulation and is a systematic approach to achieving efficiency at every level: simplified design, streamlined construction and reduced energy consumption. The four-in-one system includes rain screen, insulation, flashing and an air barrier (Table 1). The DOW™-KNIGHT CI-System enables use of thick rigid insulation up to 3.0 inches* (depending on the exterior veneer) while adaptable to all facades or cladding systems.

TABLE 1: SIMPLE PARTS – ONE INNOVATIVE SYSTEM

FRAMING SYSTEM	CONTINUOUS INSULATION	FLASHING	AIR BARRIER
CI-GIRT™ is an all-in-one cladding attachment, support and rain screen cavity system that lets you install any type of cladding over exterior-insulated wall assemblies without thermal bridging. Its unique design acts as a brace, working with the rigid insulation and fasteners for wind and cladding load resistance without sacrificing thermal efficiency. Exterior cladding options include: thin brick, metal panels, tile panels, lightweight stone panels and stucco, to name a few. All the claddings hang on the same frame, so that one building can have several different looks without altering the rain screen frame or the primary building envelope.	THERMAX™ (ci) Exterior Insulation moderates the temperature of the wall cavity, reducing the potential for dew point condensation, mold and mildew. An integral, durable acrylic-coated aluminum facer provides a drainage plane and water-resistive barrier, eliminating the extra step of installing a membrane or building wrap.	WEATHERMATE™ Flashings help protect the wall assembly from moisture entry at windows, doors and other thru-wall penetrations, including between THERMAX™ (ci) Exterior Insulation ship lapped joints. Unlike traditional flashing adhesives, WEATHERMATE™ flashing from Dow will never dry and harden giving you a longer lasting, energy efficient and more resilient seal. This saves material normally needed for field replacement on a cured and cracked seal.	Applying STYROFOAM™ Brand Spray Polyurethane Foam (SPF) Insulation (CM Series) in the steel stud wall cavity effectively blocks air infiltration by filling gaps, cracks and penetrations. **According to the Department of Energy (DOE), air leakage accounts for 25-40% of the energy used for heating and cooling in a typical building.****

In conjunction with other items found in a steel stud wall design, the DOW™-KNIGHT CI-System can contribute to multiple LEED points. Table 2 details the credit name and number, number of possible points and comments. These potential credits are based on LEED Reference Guide for Green Building Design and Construction 2009 Edition.

DOW™-KNIGHT CI-SYSTEM

*Exact insulation thickness depends on specific cladding and wall assembly details per NFPA 285 fire approval.
**DOE/Energy Star: http://www.energystar.gov/index.cfm?c=new_homes_features.hm_f_reduced_air_infiltration

TABLE 2: POTENTIAL CONTRIBUTION TO LEED POINTS FOR GREEN BUILDING DESIGN AND CONSTRUCTION 2009 EDITION – DOW™-KNIGHT CI-SYSTEM

CREDIT NUMBER	CREDIT NAME	NUMBER OF POINTS	CONTRIBUTION
Energy and Atmosphere (EA) Prerequisite 2 (Required)	Minimum Energy Performance	Mandatory	The DOW™-KNIGHT CI-System with continuous THERMAX™ (ci) Exterior Insulation plus STYROFOAM™ Brand SPF Insulation (CM Series) in the cavity helps meet/exceed ASHRAE 90.1 2007 requirements and increase energy efficiency to meet the Minimum Energy Performance prerequisite.
EA Credit 1	Optimize Energy Performance	1-19	The DOW™-KNIGHT CI-System with continuous THERMAX™ (ci) Exterior Insulation plus STYROFOAM™ Brand SPF Insulation (CM Series) in the cavity helps meet/exceed ASHRAE 90.1 2007 requirements and achieve higher energy-efficiency levels for a building by providing better insulation and air barrier properties. Along with other energy-efficiency measures for a building, the credits that can be achieved range from 1 to 19 points.
Materials and Resources (MR) Credit 2	Construction Waste Management 50% (1 point) and 75% (2 points) recycled or salvaged	1-2	The DOW™-KNIGHT CI-System components are either pre-fabricated or onsite sprayed products with little waste except for minimum on-site trims. The Knight facade and the steel that is part of the mounting system can be recycled through a local recycle center or by returning materials to the manufacturing site, thus diverting debris from landfills.
Materials and Resources (MR) Credit 3.1 & 3.2	Materials Reuse, 5% (1 point), 10% (2 points)	1-2	Many steel stud wall components, such as steel, veneer and drywall, can be salvaged, refurbished or reused materials as long as they are in desired conditions. Consult the architect and/or owner to identify these components during the design and construction process.
MR Credit 4.1 & 4.2	Recycled Content – post-consumer plus half pre-consumer, 10% (1 point) or 20% (2 points)	1-2	THERMAX™ (ci) Exterior Insulation contains 14.2%-29.6% pre-consumer recycle content depending on product thickness (0.5" to 3"). Steel stud wall components, such as steel and veneer, provide post-consumer and pre-consumer recycled content. Generally, steel has a minimum recycled content of 25 percent. Typically about 5% of steel used in the milling process is pre-consumer, with the remainder being post-consumer. Butyl formulation of WEATHERMATE™ flashing also contains recycled content.
MR Credit 5.1 & 5.2	Regional Materials, 10% (1 point) or 20% (2 points) extracted, processed and manufactured regionally	1-2	Many components of the DOW™-KNIGHT CI-System, such as steel, veneer, drywall, insulation etc., may be harvested, processed and manufactured regionally depending on the specific location of the project.
Indoor Environmental Quality (IEQ) Credit 2	Increased Ventilation	1	Indoor air quality is directly related to managing air flow and removing uncontrolled air leakage, which optimize HVAC systems. The DOW™-KNIGHT CI-System may provide support in the overall building design to help reduce the uncontrolled air infiltration by providing insulation and air barrier performance to meet ASHRAE 62.1-2007 requirements.
Indoor Environmental Quality (EQ) Credit 7.1	Thermal Comfort, design	1	The DOW™-KNIGHT CI-System with continuous THERMAX™ (ci) Exterior Insulation plus STYROFOAM™ Brand SPF Insulation (CM Series) in the cavity can help achieve better energy efficiency to meet the ASHRAE 55.2 Thermal Environmental Design Standards to provide comfort for building occupants.
Innovation and Design (ID) Credit 1.1	Innovation in Design	1	The DOW™-KNIGHT CI-System with continuous THERMAX™ (ci) Exterior Insulation plus STYROFOAM™ Brand SPF Insulation (CM Series) in the cavity with adaptable cladding systems provides rain screen, insulation, air barrier and flashing in one system with optimum energy efficiency, durability and versatile veneers to meet diverse needs in the market. In addition, both THERMAX™ insulation and STYROFOAM™ Brand SPF products have earned Cradle-to-Cradle certification.
ID Credit 1.2	Exceptional performance for Materials and Resources Credits 4.1 and 4.2	1	For a steel frame and steel roof building, considering the high recycled content of the steel from the DOW™-KNIGHT CI-System plus recycled content in other materials used on a project, an additional exceptional performance credit can be achieved if the total recycled content of the material is 30 percent or higher.
ID Credit 1.3	Exceptional performance for Materials and Resources Credits 5.1 and 5.2	1	Considering the high value items of the regional material of the building, such as concrete, steel, veneer (brick, stucco, metal panels, etc.), as well as other products used on a project, an additional exceptional performance credit can be achieved if the total regional material of the project is 30 percent or higher.
Regional Bonus Credit 1.1	Regional Specific Environmental Priority	1-4	Depending on the particular regional importance of green building design. The credits are specific to the project location by zip code, downloadable by state on the USGBC website www.usgbc.org.

*Exact insulation thickness depends on specific cladding and wall assembly details per NFPA 285 fire approval.

TABLE 3: DOW™-KNIGHT CI-SYSTEM – ANNUAL TOTAL ENERGY SAVINGS POTENTIAL[1,2]

LOCATION[3]		200,000 FT² FOOTPRINT BUILDING	100,000 FT² FOOTPRINT BUILDING	30,000 FT² FOOTPRINT BUILDING
		Wall Area (ft²) 75,132	Wall Area (ft²) 53,127	Wall Area (ft²) 29,098
Annual total kilowatt-hour (kw/h) equivalent savings	Miami	46,457	32,851	17,992
	Denver	287,963	203,622	111,524
	Chicago	380,363	268,959	147,310
	San Francisco	89,912	63,578	34,822
	Dallas	97,775	69,138	37,867
	Seattle	220,507	155,923	85,400
	Boston	331,929	234,711	128,552

(1) Compared to typical gypsum-based wall with R-19 fiberglass batt and 5/8" exterior gypsum sheathing. Effective R-value of R-7.1 for R-19 fiberglass in steel stud application (16" o.c., 6" studs); R-value of 0.56 for 5/8" gypsum board; total effective R-value of 7.56 (U=0.132).

(2) Window area not considered. Height of wall (ground to top) is 14' per story, total three stories. In all cases, study assumed natural gas furnace for heating with 90 percent efficiency, electricity for cooling with a SEER of 10. Calculations based on average heating and cooling degree-day data under www.ncdc.noaa.gov. The calculation is based on opaque wall area with conductive heat loss only.

(3) U value of 0.079: 1.5" SPF + 5/8" THERMAX™ (ci) Exterior Insulation for Miami, Dallas and San Francisco.
U value of 0.055: 1.5" SPF + 1.5" THERMAX™ (ci) Exterior Insulation for Denver and Seattle.
U value of 0.036: 1.5" SPF + 3" THERMAX™ (ci) Exterior Insulation for Chicago and Boston.

TABLE 4: CO_2 EMISSION REDUCTION IN POUNDS BASED ON ABOVE ENERGY SAVINGS

LOCATION		200,000 FT² FOOTPRINT BUILDING	100,000 FT² FOOTPRINT BUILDING	30,000 FT² FOOTPRINT BUILDING
		Wall Area (ft²) 75,132	Wall Area (ft²) 53,127	Wall Area (ft²) 29,098
CO_2 emission reduction, lbs	Miami	144,589	102,241	55,997
	Denver	211,781	149,753	82,020
	Chicago	227,540	160,896	88,123
	San Francisco	93,086	65,822	36,051
	Dallas	155,334	109,838	60,159
	Seattle	154,554	109,287	59,857
	Boston	198,987	140,706	77,065

HOW CAN A WALL CONTRIBUTE TO ENERGY SAVINGS AND CO_2 REDUCTION?

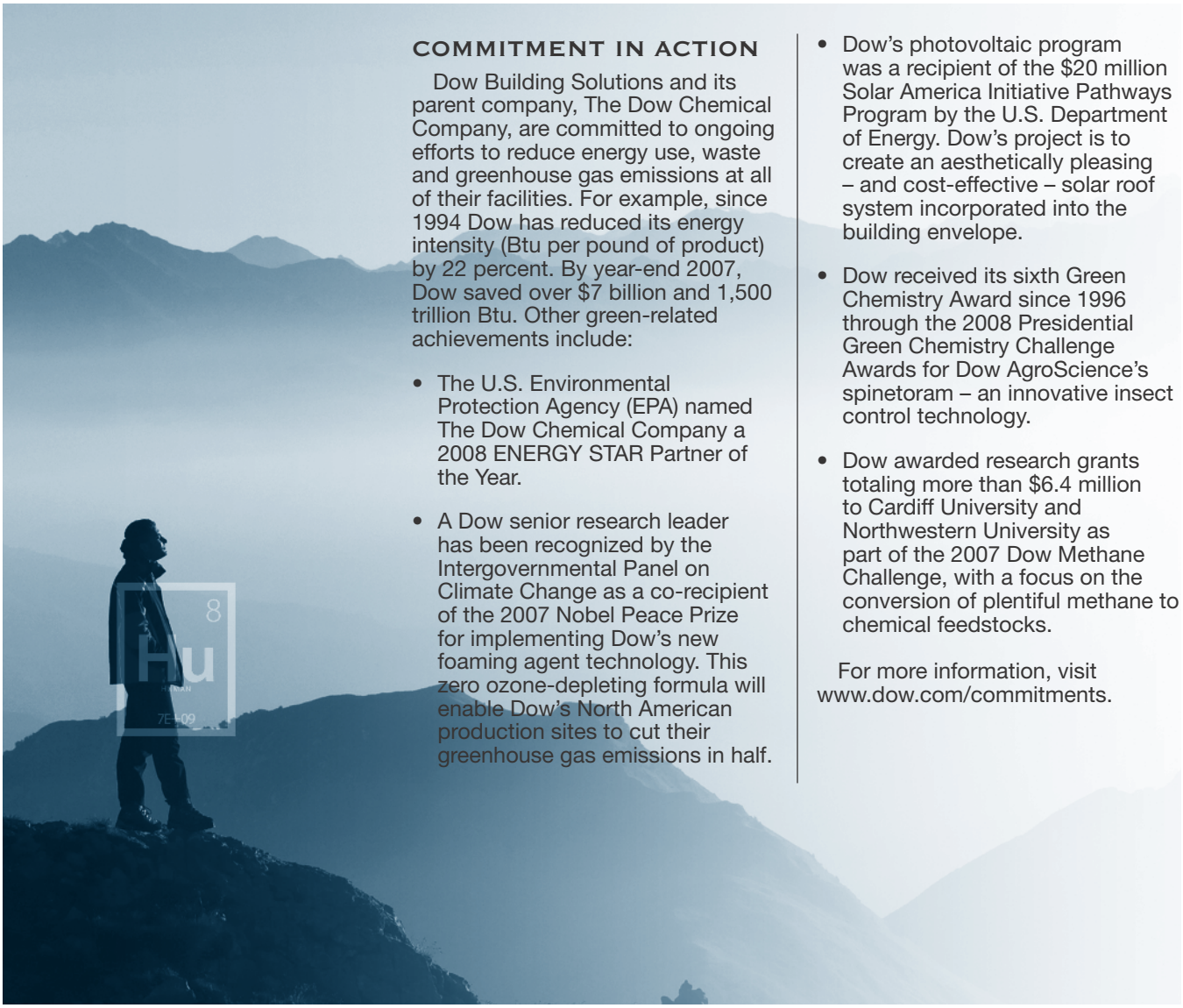
To demonstrate the potential energy savings and subsequent reduction in CO_2 that can be achieved with the DOW™-KNIGHT CI-System, Dow performed energy calculations on three square building models (footprints of 30,000 ft², 100,000 ft² and 200,000 ft²) in seven U.S. cities. Results are presented in Tables 3 and 4.

For example, based on the model in Tables 3 and 4, a 200,000 ft² building (wall area of 75,132 ft²) built with the DOW™-KNIGHT CI-System in Chicago (U value of 0.036) can reduce CO_2 emissions by 227,540 lbs compared to a building with a typical wall assembly (R-19 fiberglass batt with 5/8" gypsum board [U value of 0.132]). **That's a potential annual CO_2 reduction of 73 percent for the DOW™-KNIGHT CI-System compared to a traditional fiberglass insulated wall.**

SUSTAINABLE CLADDING:

- Thin brick has approximately 84% less embodied energy than full face brick.
- Lightweight claddings lower transportation fuel requirements (i.e. one truck can deliver nearly 10,000 SF of thin brick vs six trucks for full sized brick).
- Lightweight shell can easily equate to substantially less material and labor required for primary and secondary structural systems, not only saving money but materials as well.
- Using less materials to produce the same amount of square foot coverage (i.e. Thin Natural Stone Panels) reduces wear on the natural environment from reduced extraction of the raw material.
- Tile panels contain on average 30% pre and/or post-consumer recycled content.
- Cement board, an integral part of the acrylic stucco, contains approximately 20% pre-consumer recycled content.
- All products are Made in America, reducing transportation fuel emissions from shortened shipping distances.
- Scraps created during the manufacturing process are either converted for use as other parts or recycled.

*Exact insulation thickness depends on specific cladding and wall assembly details per NFPA 285 fire approval.



COMMITMENT IN ACTION

Dow Building Solutions and its parent company, The Dow Chemical Company, are committed to ongoing efforts to reduce energy use, waste and greenhouse gas emissions at all of their facilities. For example, since 1994 Dow has reduced its energy intensity (Btu per pound of product) by 22 percent. By year-end 2007, Dow saved over $7 billion and 1,500 trillion Btu. Other green-related achievements include:

- The U.S. Environmental Protection Agency (EPA) named The Dow Chemical Company a 2008 ENERGY STAR Partner of the Year.
- A Dow senior research leader has been recognized by the Intergovernmental Panel on Climate Change as a co-recipient of the 2007 Nobel Peace Prize for implementing Dow's new foaming agent technology. This zero ozone-depleting formula will enable Dow's North American production sites to cut their greenhouse gas emissions in half.
- Dow's photovoltaic program was a recipient of the $20 million Solar America Initiative Pathways Program by the U.S. Department of Energy. Dow's project is to create an aesthetically pleasing – and cost-effective – solar roof system incorporated into the building envelope.
- Dow received its sixth Green Chemistry Award since 1996 through the 2008 Presidential Green Chemistry Challenge Awards for Dow AgroScience's spinetoram – an innovative insect control technology.
- Dow awarded research grants totaling more than $6.4 million to Cardiff University and Northwestern University as part of the 2007 Dow Methane Challenge, with a focus on the conversion of plentiful methane to chemical feedstocks.

For more information, visit www.dow.com/commitments.

For information about the DOW™-KNIGHT CI-System and other Dow products that support sustainable design objectives, visit www.dowknightsolutions.com or call KNIGHT WALL SYSTEMS at 509-262-0104 or Dow Building Solutions at 1-866-583-BLUE (2583).

To learn more about LEED, visit www.usgbc.org.

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