

Greenest Brick for Enhancing LEED Points

I. What is LEED and why worry about LEED points?

LEED stands for "Leadership in Energy and Environmental Design". It is a Green Building Rating System developed by the U.S. Green Building Council (USGBC). This national voluntary program defines and measures what constitutes a "green" building. LEED certification shows a building and its builder and architect as being "**ecologically responsible**". More and more organizations want their new buildings to be LEED certified. Government policies often favor LEED buildings, as by requiring certain new government buildings to be LEED certified.

Buildings are LEED-certified if they achieve at least **26 points** out of a possible 69. **Silver** certification is awarded for projects with 33 to 38 points. Projects with 39 to 51 points are certified as **Gold**. The highest level of certification, for projects earning 52 points or more, is **Platinum**.

Products used in LEED projects gain credibility as "**green products**" when they help a contractor or architect earn LEED points. No one product alone can generate enough points to qualify a building for LEED certification. For a building or project to receive at least 26 points, the building/project must be "**green**" in many ways, such as using wind and solar energy, using recycled materials such as fly ash, use water efficiently, being energy efficient (e.g., use good insulations), etc.

II. What are LEED points based on?

The LEED-NC (LEED for New Construction and Major Renovation) is divided into five environmental categories, each with multiple parts or credits to recognize sustainable building practices, plus a sixth category to recognize innovative designs that greatly exceed the LEED credit requirements, or that address sustainable issues not covered by the LEED rating system. The categories are:

- (1) Sustainable Sites (14 points available)
- (2) Water Efficiency (5 points available)
- (3) Energy and Atmosphere (17 points available)
- (4) Materials and Resources (13 points available)
- (5) Indoor Environmental Quality (15 points available)
- (6) Innovation and Design Process (4 points available + 1 point for a LEED-accredited professional on the design team)

III. What is "Greenest Brick"?

Greenest Brick is a special type of brick, developed and patented by Freight Pipeline Company (FPC)¹ in USA, that is made entirely of fly ash. Fly ash is a power plant byproduct generated from burning coal. In the United States, only one-third of the fly ash is utilized; the rest is treated as an industrial waste and disposed of in slurry ponds and mine pits.

As compared to other bricks on the market, the Greenest Brick is truly the "greenest" due to the following:

- (1) It is made of 100% fly ash** Other processes and companies use fly ash to substitute for only a portion of the clay or concrete to make bricks. In such usages, the bricks normally contain less than 30% fly ash.
- (2) The Greenest Brick does not require kiln firing** which is required in manufacturing clay bricks. Therefore, **Greenest Brick uses no fossil fuel in manufacturing and creates no pollutants and greenhouse emission.**
- (3) The name "Greenest Brick" is protected by a pending U.S. Trademark.**

¹US Patent Pending (Patent Application No. 11/307023, filing date: 1/19/2006.)

IV. How many LEED points can the Greenest Brick help to win?

Use of Greenest Bricks in any building project may help win a minimum of **14 LEED points** as follows:

- (1) **TWO** points to help achieve at least 20% of recycled materials (only one point if at least 10% but less than 20% is used). [MR Credit 4.2]
(Note: Fly ash is a recycled industrial waste material.)
- (2) **TWO** points to help achieve at least 20% of recycled materials from within 500 miles of building site (only one point if at least 10% but less than 20% is within 500 miles). [MR Credit 5.2]
(Note: In the future, fly ash bricks will be produced in most states and hence will be available from within a distance of 500 miles anywhere in the U.S.)
- (3) **ONE** point from using low-emitting materials [EQ Credit 4.1]
(Note: Fly ash brick emits no pollutant; it adsorbs mercury from air and makes air cleaner.)
- (4) **ONE** point from protecting habitat affected by mining of clay to make bricks [SS. Credit 5.1]
(Note: Using fly ash bricks instead of clay bricks reduces the need for clay mining).
- (5) **ONE** point to help achieve 25% reduction in stormwater runoff [SS Credit 6.1]
(Note: Stormwater runoff is reduced if fly ash bricks instead of concrete is used for outdoor pavement. To achieve 25% reduction in stormwater will also need to implement other measures such as having gardens and lawns that promote infiltration and reduce runoff.)
- (6) **ONE** point to reduce heat island effect [SS Credit 7.1]
(Note: The natural color of fly ash bricks is a light buff with anticipated Solar Reflective Index (SRI) of approximately 60. Test of SRI is needed to substantiate this claim.)
- (7) **ONE** point for enhanced energy performance [EA Credit 1]
(Note: Fly ash bricks enhance the thermal capacity of buildings, reducing indoor temperature fluctuations, which in turn reduces the need for heating and air conditioning. It is expected that by using fly ash bricks instead of conventional wall claddings, the energy cost savings can easily exceed 10%, which enables the earning of 1 LEED point.)
- (8) **ONE** point for diverting at least 50% of building waste materials from disposal in landfill [MR Credit 2.1]
(Note: When demolished from buildings or discarded at construction sites, fly ash bricks can easily be used as aggregates for making concrete or roadbeds, instead of entering landfills which is the last resort).
- (9) **TWO** points from materials reuse (MR Credit 3.2)

(10) ONE point for low-emitting materials (MR Credit 4.1]

(Note: Fly ash bricks not only do not emit mercury, they actually adsorb mercury from the ambient air, making indoor air cleaner when fly ash bricks are used.)

(11) ONE point for thermal comfort [EQ Credit 7.1]

(Note: Fly ash brick walls provide an energy efficient envelope. Such walls reduce temperature fluctuations in buildings, which enhances the thermal comfort of building occupants.)

V. Conclusion

1. The total LEED points that may be earned by using sufficient quantity of fly ash bricks for any building project, as evaluated here, is fourteen (14). This is a conservative figure as compared to that published by the International Masonry Institute², which claims a possible 31 LEED points for use of masonry products in building projects. We claim only 14 points here for fly ash bricks (which is a masonry product) instead of 31 points in order to be conservative and credible.
2. The Greenest Brick is a new building material not considered in current (2007) LEED rating system. In the future when the committee that determines the LEED rating system realizes the unique environmental benefits of the Greenest Brick, it is believed that additional LEED points will be given to each of the two following special environmental advantages of the Greenest Brick:
 - (a) The energy used in manufacturing the Greenest Brick is only about 5% of the energy used in manufacturing clay bricks. This is due to high temperature used (over 2000 °F) in manufacturing clay bricks, which requires large amounts of energy to be consumed. **Therefore, much energy can be saved by using Greenest Bricks instead of clay bricks.**
 - (b) Much fossil fuel is burned to fire clay bricks in kilns, which causes air pollution and global warming. In contrast, no fossil fuel is burned in manufacturing Greenest Bricks. **Thus, using Greenest Bricks instead of clay bricks for buildings reduces air pollution and global warming.**

Due to the above, it is hoped that in the future LEED will grant another two points for bricks that can be manufactured with much less (at least 50% less) energy than manufacturing clay bricks, and for bricks that requires no burning of fossil fuel in manufacturing. Doing so will enable any building project to earn an extra 4 LEED points by using Greenest Bricks. This will be a good way for LEED to encourage conservation of energy and reduce global warming in manufacturing building materials including bricks, which are major building materials. The United States currently manufactures and uses 9 billion clay bricks a year, consuming much energy and contributing significantly to air pollution and global warming!

² http://www.imiweb.org/_whatsnew/leed.htm