

# RESILIENT DESIGN

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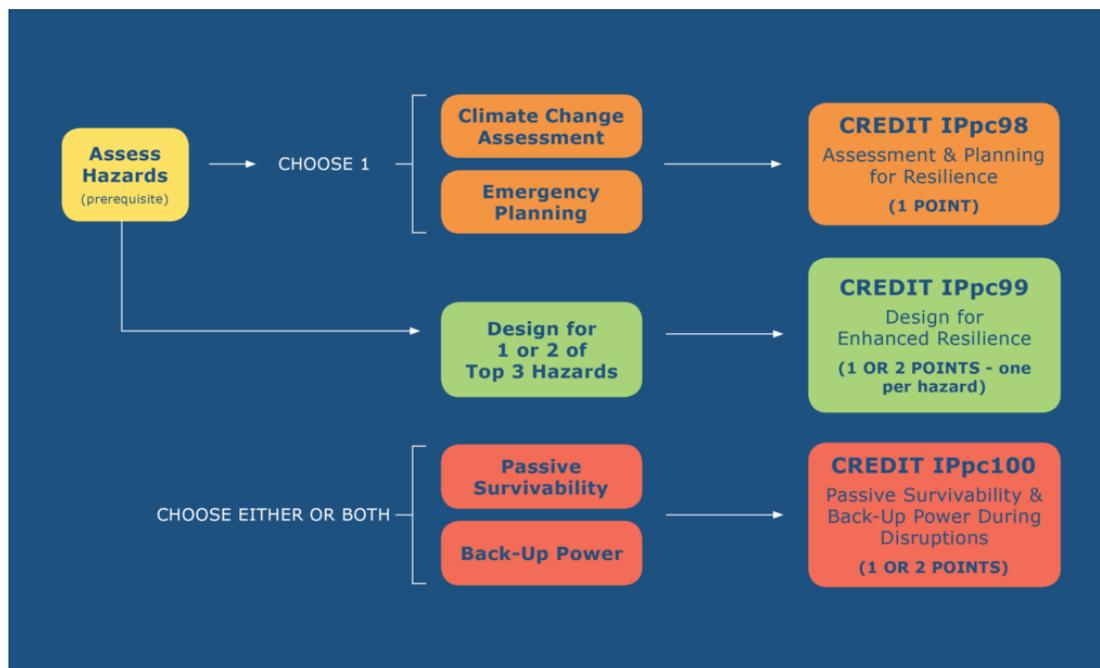
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## The LEED Pilot Credits on Resilient Design Are Back Up!

Posted by [Alex Wilson](#) on Nov 14, 2018



A schematic showing the basic structure of the three LEED pilot credits on resilient design. Graphic: Jessie Woodcock, ZGF and Andrea Lemon, BuildingGreen

The LEED pilot credits on Resilient Design are available once again in the Pilot Credit Library on the U.S. Green Building Council website. They are being rolled out this week here in Chicago at the Greenbuild Conference, along with Version 2.0 of the RELi Rating System.

### Background

The original LEED pilot credits on Resilient Design were [introduced in November 2015](#) following a two-year development process led by Mary Ann Lazarus, FAIA and me. In the LEED Rating System, pilot credits are pre-approved Innovation Credits, but they are not (yet) a part of the full rating

system. A project undergoing LEED certification can incorporate several Innovation Credits, which can either be drawn from the Pilot Credit Library or proposed as totally new credits.

Once the pilot credits on Resilient Design were introduced in 2015, the U.S. Green Building Council expanded the committee that had developed them into a formalized Resilience Working Group, chaired by Mary Ann and me. The group began work on refining the credits and assessing how they were working with LEED project teams. We also tracked for the Council other issues related to resilience.

After being available for a year, the pilot credits on Resilient Design were removed from the LEED Credit Library and became unavailable for LEED projects, though projects already registered were able to continue using the credits. The Resilience Working Group used this opportunity to refine the credits with an expectation that they would be reintroduced.

We were expecting to re-introduce the revised pilot credits at Greenbuild in 2017, but then the U.S. Green Building Council announced that the RELi Rating System had been adopted as the Council's resilience platform. About half of the members of the Resilience Working Group were folded into a new RELi Steering Committee (RSC), of which Doug Pierce, AIA is chair and I am vice-chair. The RSC has worked for the last year integrating content from the pilot credits into RELi and adopted final tweaks to Version 2.0 last week for the roll-out this week at Greenbuild.

Meanwhile, there continued to be interest in incorporating resilience measures into LEED directly, and the LEED Steering Committee convinced the staff to work on getting revised pilot credits—aligned with RELi—back into the LEED Credit Library. Mary Ann and I, along with a few members of the original Resilience Working Group (which had disbanded after RELi v.1 was introduced in November 2017) and Doug Pierce, worked on this alignment process over the last six months.

And we're thrilled that they are back up!

### **So what's new?**

Through the year-long process of improving the pilot credits before RELi was adopted by USGBC and through the process of aligning the pilot credits with RELi, some significant changes were made.

There are still three credits, 98, 99, and 100, but while only three total points were able to be earned with the original credits (one point per credit), LEED project teams can now earn one or two points both with Credit 99 and Credit 100, so there are a total of five points available.

In the paragraphs below, I describe some of the major components of the three credits and how they differ from the original credits.

### **Credit 98 – Assessment and Planning for Resilience**

Credit 98 is about assessing vulnerabilities on a site. It is a prerequisite for the credit to determine the top three hazards at the location of the project undergoing LEED certification. These include flooding, hurricanes, tornadoes, earthquakes, wildfire, drought, and landslides.

With the updated version of the credit, the list of vulnerabilities that have to be considered is expanded to include sea level rise, extreme heat, and more intense winter storms. In the original version, clearly climate-change-related risks like sea level rise were addressed in the optional part of the credit that considers *climate-related* risk management. Facing up to a changing climate is more explicit now—and incorporated into the prerequisites.

Along with considering this expanded list of potential vulnerabilities as a prerequisite, Credit 98 also requires *either* carrying out a comprehensive climate change vulnerability assessment *or* developing an emergency management plan to earn the single point available in the credit.

### **Credit 99 – Designing for Enhanced Resilience**

Credit 99 is about mitigating the top vulnerabilities identified in Credit 98. In the original version of the credit, the top-three hazards had to be addressed with mitigation measures to earn a single point. In the revised version, the project team has to address any *one or two* of the top-three vulnerabilities and earns one point for each. In other words, up to two points can be earned for this credit. All three of the top vulnerabilities—or more—can be addressed, but no additional points are earned.

In most cases other, third-party standards and recommendations are referenced with these measures. These include Fortified standards from the Institute for Business and Home Safety (IBHS), American Society of Civil Engineers (ASCE) standards, International Code Council (ICC) standards, Federal Executive Orders, the REDi Rating System on seismic design, the International Wildland-Urban Interface Code, various other LEED credits (on water-efficiency, for example), and FEMA recommended practices.

In some cases, where third-party standards were not available, we developed our own requirements, such as for landslide vulnerability, extreme heat, and winter storms.

In a few places, the need to align the pilot credits with RELi resulted in changes to the Credit 99 requirements. For example, for flooding risk, the original credit called for keeping the lowest floor at Base Flood Elevation plus five feet (BFE + 5), and that has changed to BFE + 3 with the new credit. We also relaxed the water conservation requirements when drought is identified as a top hazard: the original credit required a 60% reduction in total water use, while the new credit requires a 50% reduction in outdoor (landscape) water use and a 40% reduction in indoor water use.

New in Credit 99 are mitigation measures addressing winter storms, hail, extreme heat, and sea level rise.

### **Credit 100 – Passive Survivability and Back-Up Power During Disruptions**

Credit 100 is where the pilot credits really broke new ground, especially by addressing passive survivability—the idea that buildings should be able to keep occupants safe during extended power outages or interruptions in heating fuel. The credit addresses this issue as well as back-up power.

A big change with the revised credit is that it no longer addresses access to potable water, as was addressed in the original credit—ensuring access to water is important, but the credit hadn't been comprehensive in addressing this complex issue. In the original version, three issues were covered—passive survivability (thermal habitability), back-up power, and access to potable water—and to earn the single available point you had to address two of those three issues.

In the revised Credit 100, you can address either passive survivability or back-up power—or both—and earn a point for each. So, a total of two points can be earned.

With passive survivability, the original credit had one option for demonstrating compliance: using a methodology we developed that relied on Standard Effective Temperature or SET (which factors in dry-bulb temperature, relative humidity, and mean radiant temperature). We defined a “safe” temperature range of 54°F SET to 86°F SET and stipulated the number of degree-days (or degree-hours) of deviation from that temperature range allowable during a design week in the winter and a

design week in the summer. These requirements vary by occupancy—being more stringent in residential buildings. Thermal modeling is required to demonstrate compliance.

In the revised credit there are two other compliance paths. One utilizes a methodology relying on psychrometric analysis that considers either wet-bulb globe temperature (WBGT) or Heat Index. Maximum and minimum temperatures using either of these metrics are defined, and these are strict, not-to-exceed, limits. As with the SET methodology, thermal modeling is required to demonstrate compliance with this methodology.

The third compliance path now available in the credit is for the building to go through Passive House certification, using either the German Passivhaus Institute or the Passive House Institute U.S. (PHIUS) procedures. The reasoning for this compliance path is that a building built to Passive House standards will have a good enough envelope and other energy features to keep occupants safe, and the methodology is well understood—not easy to achieve, but well understood. (Whether or not this is a reasonable assumption—especially for warmer climates—is yet to be determined.)

A significant change with the passive survivability component of Credit 100 was needed to align the credit with the *thermal safety* requirement called for in RELi. In RELi, the temperature requirements have to be maintained for *four days*, rather than a week—as was required for residential buildings in the original pilot credit. Because we did not change the specific requirements in the SET methodology, this change makes earning the credit somewhat easier (the number of degree-days of deviation from the thermally safe zone is measured over four days rather than seven).

### **Back-Up Power in Credit 100**

The back-up power component of Credit 100 is about providing power to critical loads during an extended power outage. The intent hasn't changed, but the revised credit has some significant differences. First of all, there are now two compliance paths: either that back-up power needs to be sufficient to maintain the safe thermal conditions specified in the first part of Credit 100, or specific critical loads must be satisfied with back-up power.

Relative to the critical loads, there is greater flexibility as to which loads must be satisfied than was the case in the original credit—the design teams needs to figure out what the critical loads are, but they have to satisfy at least three critical loads from a list provided in the credit.

The duration over which the back-up power must be available is different than in the original credit—to align with RELi. Originally for residential buildings Credit 100 required back-up power for a full week if provided with fuel-fired generators, while three days were required for non-residential buildings relying on fuel-fired generators. Now there are different back-up power requirements for different building types, but the back-up power is required for no more than four days.

Both the original and revised credit allow the length of time over which back-up power must be provided to be reduced if that power is provided with a renewable energy system and battery storage. In the original credit, with solar and battery storage the back-up power requirement dropped to 72 hours and 24 hours, respectively, for residential and non-residential buildings. With the revised credit, the duration requirement is simply halved when renewable energy (either solar or wind) and battery storage is used.

### **These are still pilot credits**

This means that the pilot credits will likely evolve. We are interested in hearing feedback about what works and what doesn't work. Feedback can be provided through the [LEEDuser forum](#), directly to

U.S. Green Building Council or Green Business Certification, Inc. (GBCI) staff, or to the Resilient Design Institute: [info@ResilientDesign.org](mailto:info@ResilientDesign.org).

You can access the revised pilot credits here:

[Credit 98 – Assessment and Planning for Resilience](#)

[Credit 99 – Design for Enhanced Resilience](#)

[Credit 100 – Passive Survivability and Back-Up Power During Disruptions](#)

Thanks to all who worked hard on getting these pilot credits back up, including Mary Ann Lazarus, FAIA, Valerie Walsh, and Chuck Miccolis of the original USGBC Resilience Working Group; Susan Dorn, Jennifer Druliner, and Batya Metalitz of USGBC, and Doug Pierce of Perkins + Will and the RELi Rating System.

# # # # #

Along with founding the [Resilient Design Institute](#) in 2012, Alex is founder of [BuildingGreen, Inc.](#) To keep up with his latest articles and musings, you can [sign up for his Twitter feed](#). To receive e-mail notices of new blogs, sign up at the top of the page.

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